







RANDOM RECORDS OF A LIFETIME
DEVOTED TO SCIENCE AND ART, 1846-1931

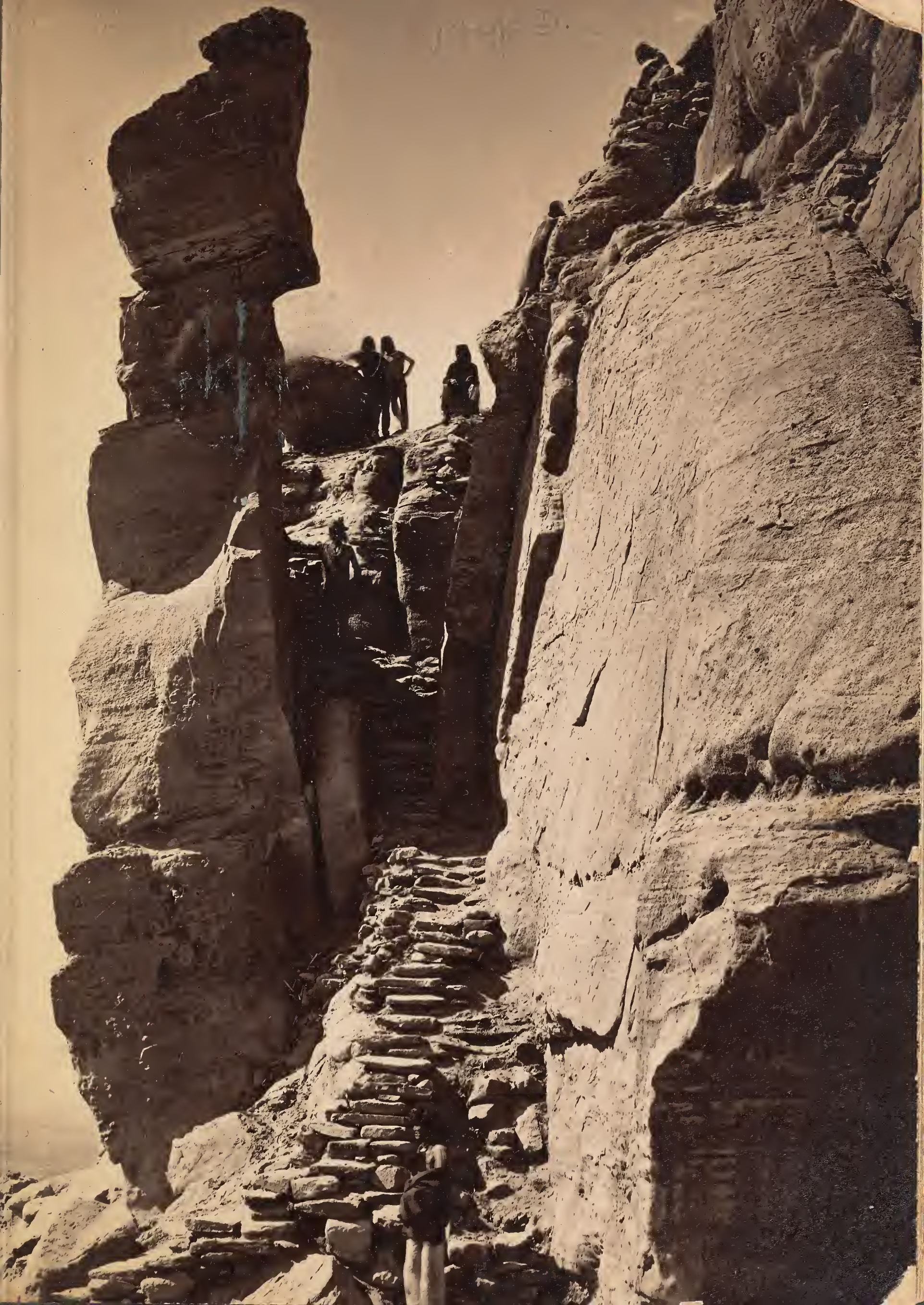
BY W. H. HOLMES

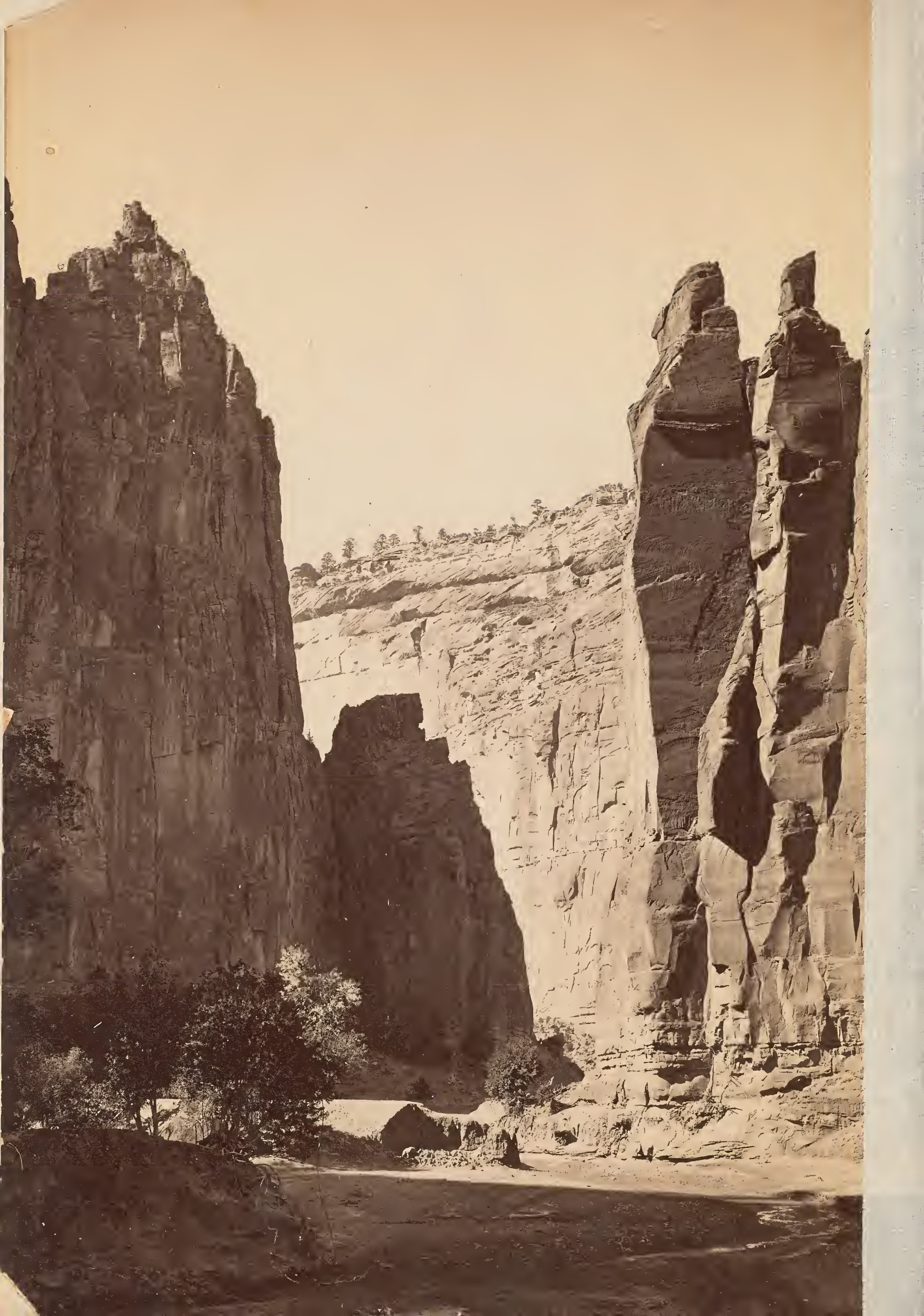
VOLUME IV, PART II

THE CLIFF DWELLERS

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SECTION II Miscellany





1
Cliff Dwellers. - This term is often applied to designate the former dwellers in the cliffs of the arid region, who without question belonged, at least in the main, to the group of tribes now known as the pueblos or town-builders. The plateau country of Arizona, New Mexico, Colorado, and Utah abounds in natural recesses and shallow caverns weathered in the faces of the cliffs; primitive tribes on taking possession of the region, although by preference, no doubt, settling in the valleys along the running streams, would in many cases naturally occupy the ready-made shelters for residence, storage, and burial, and for hiding and defense in time of danger. This occupancy would in time lead to the building of marginal walls for protection and houses within for dwelling, and later on to the enlargement of the rooms by excavation when the formations permitted, and finally to the excavation of commodious dwellings such as are now found in many sections of the arid region. Archeologists thus find it convenient to distinguish

two general classes of cliff dwellings, the cliff house proper, constructed of masonry, and the cavate house, excavated in the cliffs.

It is commonly believed that the agricultural tribes of pre-Spanish times, who built populous towns and developed extensive irrigation systems, resorted to the cliffs, not from choice, but because of the encroachment of warlike tribes, such as the Apache, Ute, Comanche, and Navaho, who were probably non-agricultural, having no well established place of abode. This must be true to some extent, for no people unless urged by dire necessity would resort to fastnesses in remote canyon walls or to the margins of barren and almost inaccessible plateaus and there establish their dwellings at enormous cost of time and labor; and it is equally certain that a people once forced to these retreats would, when the stress was removed, descend to the lowlands to reestablish their houses where water is convenient and in the immediate vicinity of

arable lands. Although these motives of hiding and defense cannot be overlooked, it appears that many of the cliff sites were near streams and fields, and were occupied because they afforded shelter and were natural dwelling places. It is important to note, also, that many of the cliff houses, built and excavated, are mere storage places for corn and other property, while many others are outlooks from which the fields below could be watched and the approach of strangers observed. In some districts proof of post-Spanish occupation of many sites exists. Walls of houses are built upon deposits accumulated since sheep were introduced, and adobe bricks, which were not used in prehistoric times, appear in some cases. A well authenticated tradition exists among the Hopi that, about the middle of the 18th century, a group of their clans, the Asa people, deserted their village on account of an epidemic and removed to the Canyon de Chelly, where they

occupied the cliff shelters for a considerable period, intermarrying with the Navaho.

The area in which the cliff dwellings occur is practically coextensive with that in which are now found traces of town-building and relics attributable to the pueblo tribes. The most noteworthy of these groups of built dwellings are found in the canyons of the Mesa Verde in Colorado, in Hovenweep and Montezuma canyons in Utah, in canyon de Chelly and its branches in N. E. Arizona; and of the cavate variety, in the cliffs of the Jemez plateau facing the Rio Grande and in the Verde valley. Although there are local differences in style of building, construction, plan, and finish, the main characteristics of the structures are much the same everywhere. Corresponding differences with general likeness are observed in implements, utensils, and ornaments associated with the ruins - facts which go to show that in early periods, as now, numerous tribal groups were represented in the region, and

that then, as now, there was a general community of culture, if not kinship in blood.

Owing to differences in the composition of the rocky strata, the natural shelters occupied by the cliff dwellers ~~are~~ ^{varied} ~~very~~ greatly in character. While many are mere horizontal crevices or isolated niches, large enough only for men to crawl into and build minute stone lodges, there are extensive chambers, with comparatively level floors and roofs, opening outward in great sweeps of solid rock surface, more imposing than any structure built by human hands. These latter are capable of accommodating not merely single households, but communities of considerable size. The niches occur at all levels in cliffs rising to the height of nearly a thousand feet, and are often approached with great difficulty from below or, in rare cases, from above. Where the way is very steep, niche stairways were cut in the rock face, making ap-

proach possible. In the typical cliff dwelling of this class, the entire floor of the niche is occupied, the doorway giving entrance through the outer wall, which is built up vertically from the brink of the rocky shelf, or rises one, two, or more stories in height, or to the rocky roof where this is low and overhanging. In the larger shelters the buildings are much diversified in plan and elevation owing to irregularities in the conformation of the floor and walls. The first floor was the rock surface, *or, if that was uneven, of ~~cast~~ adobe or flagstones,* and upper floors were constructed of poles set in the masonry, often projecting through the walls, and overlaid with smaller poles and willows, finished above with adobe cement. Some of the rooms in the larger buildings were round, corresponding to the kivas, or ceremonial chambers, of the lowland pueblos. The masonry is excellent, the rather small stones, gathered in many cases from distant sites, being laid in ~~adobe~~ mortar. The stones were rarely dressed, but were carefully selected, so that the wall

surface was even; and in some cases a decorative effect was given by alternating layers of smaller and larger pieces and by chinking the crevices with spalls. The walls were sometimes plastered inside and out and finished with clay paint. The doorways were small and squarish, and often did not extend to the floor, except an opening or square notch in the center for the passage of the feet. *The lintels were of stone slabs or* Windows, or outlook apertures, were numerous and generally small. *is* The cliff dwellings to which the term cavate is applied are not built, but dug in the cliffs. Where the formations were friable or chalky, natural recesses or openings were enlarged by digging, and this led to the excavation of chambers and groups of chambers at points where no openings previously existed. In cases where the front opening was large, either originally or through the effects of weathering, it was walled up as in the ordinary cliff dwelling, the doors and openings being of usual type; but the typical cavate dwelling ^{is} entered through a small

consisted of a number of slabs or small timbers.

hewn opening or doorway ^{and} consists of one or more chambers,

~~approximately rectangular in outline, adapted to the needs of the occupants~~
~~generally of some irregular shape.~~ The floor is ~~generally~~ ^{often}

below the level of the threshold, and both floors and walls

are sometimes plastered; and in cases ^{a simple} ~~an~~ ornamental dado in

one or more colors is carried around ^{one or more of principal} the rooms. ^{Rather rarely} ~~Crude fire-~~

places occur near the entrance, sometimes provided with smoke

vents; and numerous niches, alcoves, and storage places are

excavated at convenient points. In front of the excavated

^{Sometimes} rooms porches were built of poles, brush, and stones, the

cliff wall furnishing the posterior support for roof and floor

beams. This class of cliff dwellings ^{are} ~~is~~ most numerous on

the eastern side of the Jemez plateau, ^{facing the Rio Grande,} where almost every

northern escarpment of the mesas between the mountains and

the ^{River} ~~Rio Grande~~ ^{is} ~~are~~ literally honeycombed with them (Mindeleff,

^{, Baudelier} Hewett). They are also numerous along ~~the northern tributar-~~

^{and its northern tributaries} ~~ies of~~ the San Juan in New Mexico, ^{and} Colorado, ~~and Utah~~ (Holmes),

and in the valley of the Rio Verde in Arizona (Mindeleff).

The minor works of art associated with the cliff dwellings are in general closely analogous to similar remains from the plateau and village sites of the same section. This applies to basketry, pottery, textile products, stone implements and utensils, and various kinds of weapons and ornaments. The presence of agricultural implements and of deposits of charred corn in many places indicates that the people depended largely upon agriculture. The antiquity of the cliff dwellings can only be surmised. That many of them were occupied in comparatively recent times is apparent from their excellent state of preservation, but their great numbers and the extent of the work accomplished suggest very considerable antiquity. When the occupation of the cliffs began, whether 500 or 5000 years ago, must for the present remain a question. Some travelers have reported the occurrence of ancient stone houses overwhelmed and destroyed by flows of lava, and have inferred great age from this; but verification of these reports is

wanting. Striking differences in the crania of earlier and later occupants of the cliff dwellings are cited to prove early occupancy by a distinct race, but craniologists observe that equally striking differences exist between tribes living side by side at the present day. It may be safely said that up to the present time no evidence of the former general occupancy of the region by peoples other than those now classed as pueblo Indians has been furnished. Among the more important examples of the cliff ruins are the Cliff Palace, in Walnut Canyon, Mesa Verde; Casa Blanca, Canyon de Chelly; and Montezuma Castle, on Beaver creek, Arizona. Intimately associated with these cliff dwellings and situated on the plateaus immediately above or at the base of the cliffs below, are ruins of pueblos in every way identical with the pueblos in the open country (see Pueblos). Among works treating of the cliff dwellings are, Simpson, Sen. Ex. Doc. 64, 1st Sess., 31st Cong.; Stevenson, Bull. Am. Geog. Soc., 1886; Holmes,

Hayden Sur. 1876; Jackson, Rep. Hayden Sur. 1874; Chapin,
Land of the Cliff Dwellers, 1892; Birdsall, Cliff Dwellings
of the Mesa Verde, Bull. Am. Geog. Soc., 1891; Nordenskiöld,
Cliff Dwellings of the Mesa Verde; Mindereff, Aboriginal Re-
mains in Verde valley, Arizona, 13th Ann. Rep. B. A. E.; Prud-
den, Am. Anthr., v. 5, No. 2; Mearns, Pop. Sci., v. xxvii;
Lummis, Land of Sunshine, 1895; Hoffman; Hayden Sur. 1876;
Fewkes, 17th Ann. Rep., B. A. E., Pt. II; Hewitt, S. I. Quar-
terly, 1896.

W. H. Holmes

Oil painting by Wm H. Holmes



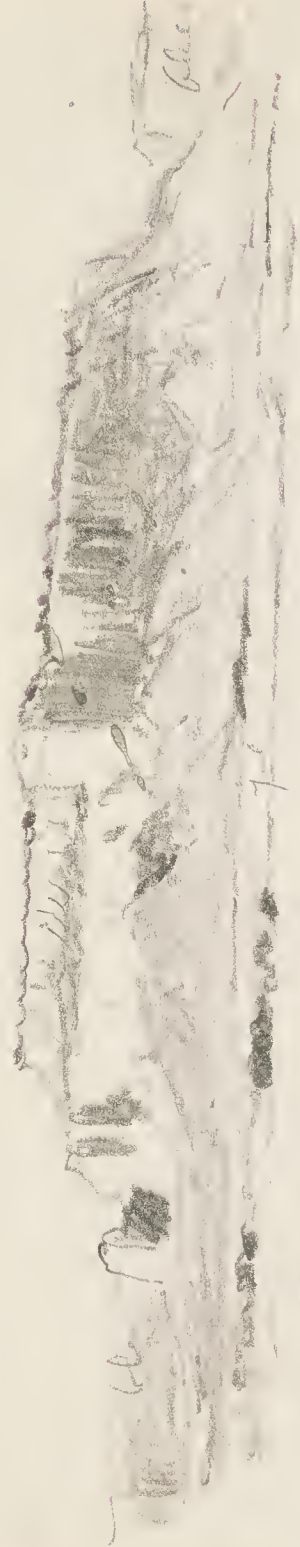
Cliff houses, Colorado, an oil painting by Wm H. Holmes
1873



Mesa Verde - a typical plateau of the
Pueblo region

Alfred A. Mearns

Red in color
dark purple blue



Long
with

ANCIENT CLIFF DWELLING.

The arid region of Colorado, Utah, Arizona, and New Mexico abounds in canyons and plateaus; and the rocky walls have been carved by the elements into many fanciful shapes. Here also were left shelves, shelters, and caverns, and these were extensively utilized by the ancient tribes for dwelling purposes, from which circumstances they derive their name, "Cliff Dwellers." Along the face of the natural recesses, walls of stone were built up, behind which rooms of various sizes were formed by partitions of rude masonry. These were reached by natural pathways, by steps cut into the rock, and by wooden ladders, and they served for defense as well as for abodes. By the remains of industrial arts found in the cliff structures, their builders are shown to have been the ancestors of the Pueblo tribes.

This group forms one of a series designed to set forth the dwellings and home life of native tribes in the Western Hemisphere. Model of a small cliff house in canyon de Chelly, Arizona, modeled by W. H. Holmes for the Survey Exhibit at the Centennial Exposition in Philadelphia, 1876.



CLIFF RUIN IN CANON RIO MANCOS, COLORADO. Scale 1:24.

Model of a Mancos Cliff ruin, modeled for the survey
& museum exhibit at the Centennial 1876, by W.H. Holmes

PEABODY MUSEUM OF AMERICAN ARCHAEOLOGY AND ETHNOLOGY
HARVARD UNIVERSITY

Cambridge, Mass. Apr. 24, 1876.

My dear Mr. Holmes:

Many thanks for the piece of matting from the cliff house. I regard it as a very valuable specimen and I shall mount it carefully between glass for the Museum. Have you seen any similar matting in use in any of the present Pueblos? It is specially interesting to me as I have fragments of mats from the ancient graves in Peru somewhat like it. I am as yet not at all satisfied with the theory regarding the ancient ruins of Col. and I hope you will be able to get more material from them and clear up the question. I wish I could get a chance to have a few months on the ground. This working at home about such things is not at all satisfactory.

I was very much interested in your last bulletin which Dr. Bissels sent me. You have all done good work there and have given much information of great value. The more I find out about the ruins the more I am convinced that we must look to the south for their origin. I feel greatly indebted to you for this fragment of mat and to Dr. Hayden for the photographs he sent me of the Central Am. ruins. I hope Mr. Jackson was successful with his models of the Cliff houses and that I can make some arrangement by which I can get copies for the Peabody Museum. If he is able to let me know at what cost I can obtain copies I wish he would do so that I may get the proper appropriation for the same.

With kind regards to Dr. Hayden, Mr. Jackson and others, believe me

Truly yours,

/s/ F. W. PUTNAM

P. S. I have seen a note in (the Nat.?) of a jar found by your party in Colorado that was said to be like the black Peruvian jars. If this is so, it is a very important matter and I hope you will have the jar figured. I have a large collection of Peruvian pottery that I shall soon describe and I would like to know more about your jar. I have pottery like what you figure on pl. 13 from a mound in Utah and am having cuts made for publication. I simply mention this fact in my report soon to be issued.

F.W.P.

Mr. W. H. Holmes,
Washington, D. C.



Indian Rain
Symbol

Drawn by W. H. Holmes
for title page of Bureau
Publications, about 1878.



Cliff houses + ruins,

on the Rio Mancos, Colorado, 1874
Drawing by W.H.H.

Written by me 57 years after
with

EARLY STUDIES OF THE CLIFF DWELLINGS OF COLORADO

Very few of my friends of today know of my early work among the cliff dwellings of Colorado. I was a member of the Geological Staff of the Hayden Survey of the Territories in 1873, 74 and 75 and reported on the ancient cliff dwellings encountered during those years. My official reports are now hidden by the varied agencies of oblivion of more than one-half a century, and it is gratifying to me to find in a recently published work by Dr. Edgar L. Hewett the following commentary reference to my explorations in this field:

"A brief history of the origin and progress of the study of early man in the Southwest may here be in order.

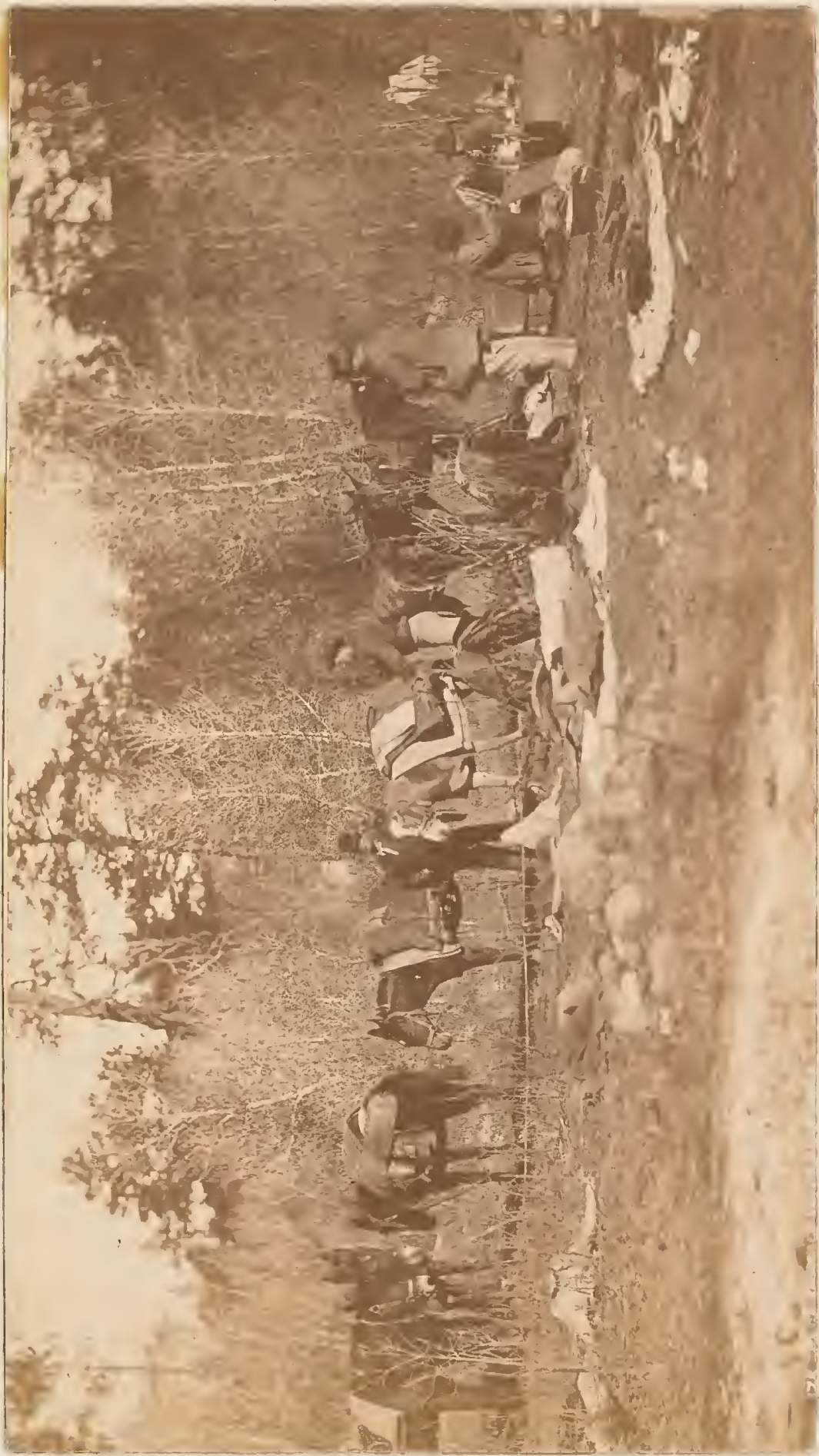
"The foundations on which southwestern archaeology have been built were laid in the last quarter of the nineteenth century. Many valuable reports were written prior to that time but nothing that would afford the basis for a substantial scientific structure. William H. Holmes was the founder of the science. He prepared the way through his geological studies in the Southwest and then proceeded with his masterly interpretations of the remains left by man. He wiped out the mythical ideas of 'vanished races,' demonstrating that the ancient cliff-dwellers were simply the Pueblo Indians of the centuries preceding the European occupation. We owe it to him that all students of man now concede that the archaeology of the American Southwest is the early history of the Pueblo Indians. It is

regrettable that there is still need for clarification. A veil of false mystery still shrouds these regions in the popular mind. The special writers want buried cities and sepulchres comparable to that of Tut-ankh-Amen and create them for the public if the archaeologist will not. The belief is still too prevalent that distinct races flourished on and long ago vanished from the American continent. The public has never accepted the fact, and archaeologists have been singularly timid about asserting it, that in studying the archaeology of those regions we are studying the early history of Indian people who still survive, who built no cities, who left no tombstones or sarcophagi. In some respects the science of American archaeology is still in the romantic stage. The great service done by William H. Holmes, in clarifying all this and setting the students of early America on the right road, did not cease with the achievements mentioned above but has steadily continued for half a century. He has stood like a rock against the acceptance of paleolithic man in America on insufficient evidence and has set a standard of scientific exactness that will enable us to avoid some of the pitfalls that abound in archaeology. ...

"John Wesley Powell, starting, like Mr. Holmes, in the geological field, sensed the importance of the study of the Pueblos, both living and ancient, as well as of the entire native American race. Through him the Bureau of American

Ethnology was founded and placed under the aegis of the Smithsonian Institution. To realize the value of Major Powell's contribution, you must look at the working library of an Americanist, see what a large section of it consists of publications of the Bureau of American Ethnology and related units under the Smithsonian Institution, and if a teacher of American ethnology and archaeology, see if you can find any sounder principles on which to base your work than in the administrative reports of Major Powell."

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Packings up - Colorado, 1873



Mitchell
packer

Tom Cooper
packer

Walter Paris
artist

John Raymond
cook

(next page necessary)

SURVEY OF THE SAN JUAN REGION, 1875.

This was an unusually eventful year for me. On May 1st, 1875, I was appointed Assistant Geologist on the Survey of the Territories, salary \$2400.00, and given charge of the San Juan Division of the Survey, with George B. Chittenden as Topographic Engineer.

The spring season was spent in Washington finishing up the reports and illustrations of the previous year, and editing and supervising engraving and printing work. Early in June my party assembled at Denver to arrange for the march into the San Juan Country, Southwestern Colorado and adjacent areas in Arizona and Utah. My report as Geologist is published in the Report of the Survey of the Territories for 1875, pages 237-276, and separate accounts of events of particular interest appear in other connections. The report on the ancient ruins of the region, which was published in the 1876 report, pages 383 - 408, is the most important of the latter. My career as an archaeologist and anthropologist began with the study of these most interesting antiquities.

There were many features of interest, geological and otherwise in the summer's explorations, among which the most important was my observations of the laccolite (stone lake) intrusions of lava among the sedimentary strata. This feature is recorded in "Contributions to the History of American Geology" by George P. Merrill, separate publication from the Report of the U.S. National Museum for 1904, page 601, with portrait. For Professor



Camp under the Cottonwoods, 875-
New Albrecht, Montana

The season's field work began at La Plata camp, San Juan County, Colorado, Tuesday, July 27, 1875. I started the train this morning with thirty days' provisions. Our intention was to go direct to Ute peak, thence to the west and south. Jackson (W.H.) marches with us for some days. He is on his way to the Moqui (Hopi) country, and intends to be out some five weeks. Mail was expected this morning and we concluded to wait until afternoon. Mr. Charles Aldrich is to go with us to Ute Peak and then return. No mail received at 3:00 o'clock and Jackson and Aldrich remained to get it in the morning. Made Mancos camp July 28th.

Left Mancos camp with the intention of marching about fifteen miles to the west but found no water until we reached the base of Ute peak, a distance of thirty-five miles. Encountered Nara Guinnep's camp at about 5:00 o'clock. An old man called "How-do-do Bueno" pointed out a spring to us - a very weak and obscure one - the only water in the neighborhood. Without the Indian's advice we should probably have had a dry camp.

Cretaceous rocks only are exposed along the trail. Five miles from the Mancos we passed the divide into the McElmo. The inoceramus limestone is exposed near the divide. On the left rises the escarped cliffs of Mesa Verde. The lower slopes for 800 or a 1,000 feet are of the upper cretaceous shales, then

My numerous panoramic views were in long books and were turned over to the new Geological Survey.

comes 200 or 250 feet of sandstones embedded with shales above and below, then 600 or 800 feet of shale, and the coal series, and the upper escarpment of about 150 feet of comparatively solid sandstone. Along the north face of the Mesa this upper escarpment stands well back (See sketch from Ute Peak). Three miles down the McElmo, No 1 cretaceous is exposed in the creek bed just below the cottonwoods. Twenty-six miles from Mancos ranch the variegated shales are first seen. No. 1 does not seem to be more than 200 feet thick. It is of soft, yellowish sandstone.

At camp, the canyon of the McElmo is about 400 ft. deep, and the sandstones beneath the variegated beds begin to make their appearance. Camp at Naio Guinneps, July 29th.

Jackson and Aldrich did not come; the mail is probably late. Chittenden and Brandage^e go across the canyon to make a topographical station. I rode out on a skirmish. Passed up to the immediate base of Ute peak and then back toward Mesa Verde. Came upon a group of ruins within a mile of camp at the base of a shallow side canyon of McElmo creek. The main ruin is a great treble-walled tower that stands amidst a cluster of irregular apartments some 60 or 80 in number, and is certainly of great interest (See drawing, plan, and measurements in large drawing book). There is also on the

brink of the cliff the base of a small tower and on a lower level one wall of a two-story house. At the base of the bluff and on the neighboring points are groups of almost shapeless piles of ruins--depressions surrounded by raised walls from two to five feet high. No evidence of hewn stone or well built walls.

In returning to camp from this place I met Mr. Aldrich and Mr. Barber who had set out to visit the ruin of Aztec Springs. Jackson and Mr. Aldrich had reached camp safely in the middle of the afternoon. I accompanied these gentlemen to the ruins five miles south of camp and at the head waters of Arroyo creek. These ruins form the grandest pile that I have yet seen. I estimated them to cover 480,000 square feet of ground to an average depth of 4 or 5 feet. They are located on a green spot some 1-1/2 or 2 miles from the base of Mesa Verde and are built of the sandstone of the Mesa, and of the vaculite, lime-sandstone which outcrops in different parts of the plain. There have been two main structures, the western one being probably the most important. The building has been rectangular in plan, the walls running pretty nearly with the points of the compass. They are still about 15 ft high and are fairly covered with an immense body of debris from the fallen parts. Originally they could not have been less than 30 or 40 feet high. The wall is double, being

a space of about 7 feet between the inner and outer walls. Partitions cut this space into rooms. The enclosed part is divided into three apartments (see plan in large sketch book). A depression in which there was formerly a spring is under the south wall. The house and spring have been partially or entirely enclosed by a connecting line of houses or fortifications, of which the plan will give a good idea.

The eastern or lower house has a double wall only on the north side. This part still stands some 12 feet high and is built of well-dressed stone. The walls on the east, south and west have been thin and stand now only 2 or 3 feet high and are without much debris, showing that they were not high. Near the center of the enclosure is a circular basin which seems to have been a water tank or reservoir. There appear to be no out-houses to the structure. There is a great deal of broken pottery but no tools or indication of paths or roads.

July 30. The ascent of Ute peak. - Climbed Ute peak. Mr. Aldrich accompanied us. Had 1400 feet climb. Made it in 50 minutes. From the summit we could trace the course of San Juan river for nearly a hundred miles; could see the mountains of the Rio Mancos, McElmo, and Montezuma creeks. Could see Rough mountain, Monumental valley, the Blue and C^hrés^o mountains, the Needles, Mesa Verde, mountains, and the valley of the Dolores.

Such a country as that to the west I have never seen and never hope to see again. It is dry as a desert, as monotonous as a plain, and as complicated and impenetrable as a labyrinth, but it must be explored; the dry canyons must be meandered and the blazing-hot plateaus plotted. The glistening thread of the San Juan is our only hope. When that river is once reached we can make running trips from it to the north and south and probably be able to connect with the work on the Dolores to the north and reach the ^{Arizona} line on the south.

The rock of this mountain is a trachite, very hard, with much black hornblend and breaks off in small plates which rattle and jingle under our feet. Fragments of the cretaceous shale and of numbers 2 and 3 cretaceous have been caught up in the trachite and may be seen in places nearly all over the Ute mountain group. The beds in general have not been raised much excepting the bending up at the edges, as seen at the south end. The canyon of the McElmo cuts through the slightly anti-clinal under the north face of the peak, exposing about 1000 feet of shales beneath No. 1, 300 of which are red.

July 31. This morning we said goodbye to Naio Guinnep and How-do-do Bueno, who with their people had boarded for three days with us. These Indians have been quite useful to us, but they eat like fury. I started down the McElmo ex-



pecting to march to the San Juan 30 or 35 miles away. We passed by the Indians corn fields, some damp patches in which they have planted a little corn, less than an acre in all. It grows in clusters, 100 stalks in a hill. It will soon be in silk if the dry weather does not cut it off completely. Jackson and Harry rode on ahead to look for water; found some at the ruined castle on the Hovenweep, but none where we camped for the night. At the south base of Ute peak beginning in the creek bed we get the following section: about two hundred feet of sandstones, reddish purple, irregularly bedded, thick and thin lamination and much impurity. Clay pockets of speckled and rotten patches, etc. 150 feet pale, grayish red, massive sandstone corresponding probably to the yellow sandstone of the border country on the east next to the plains. 300 or 400 feet of yellowish and purple sandstones somewhat resembling No. 1. 200 or 300 feet of the variegated marls, referably doubtless to the upper Jurrassic; 80 or 100 feet of the lower part of the yellow sandstones of the mountain--the escarpment of the upper tables. These beds seem to dip slightly to the south, pitching under Ute mountain as indicated in the sketch. No. 1 joins the trachite for two or three miles along the north base of the mountain. The shale only seems to have been folded up against the intruded lava--no fossils found.



Passed a number of ruins. Among others "battle rock" said by tradition to be the sight of the last battle between the ancient town-builders and the encroaching Utes. It is an interesting and picturesque place (see plan and sketch). Saw also ruined tower. Reached the Hovenweep by crossing the tongue of tableland that lies between the McElmo and its principal tributary. "Hovenweep" signifies in Ute, deserted land or canyon. Encamped near what must have been an extensive, fortified castle. (See Jackson's views and plan).

August 1st, Hovenweep castle. Jackson and Harry rode westward on a dim trail in the morning to look for ruins and to search the Montezuma for water. I followed them to the west fork of Hovenweep and returned to camp early. Hot day. No. 1 caps all the higher mesas, the variegated shale beneath has a great deal of hard rock seemingly stained and impregnated with iron. The surfaces of the slopes are carved into finely, sometimes coarsely broken fragments of the dark glistening rock. Can only guess at the thickness for it grades down into the subordinate bed of sandstones and shales. 300 feet will perhaps cover the entire series. These last named beds of sandstones sometimes form subordinate mesas but never so regularly as that formed by the sandstones of No. 1. In the afternoon I went back to the cliff 100 yards from camp and made a sketch

of a cliff house and drew in the doorway a grizzled hag who might appropriately have been the occupant of such an abode.

August 2d, Monday. Began march to San Juan by way of Hovenweep and McElmo 25 miles. Chittenden and Brandegge crossed to the Montezuma. I undertook to meander the stream along the trail. Found some ruins and fortified rocks, also on the promontory between the Hovenweep and the McElmo a burial ground of these ancient people. Rows of rocks set on edge mark the graves. Some were rectangular, some circular, and in places many were grouped together. Digging yielded only charcoal. In geology there is no change excepting that additional beds are exposed in the lower part of the valley some 800 or 900 feet below No. 1.

August 3, San Juan encampment. Chittenden failed to reach camp. His mule gave out on the Montezuma. Jackson and his party left us this morning on their way to the Moquis. I went down the river 6 miles with him. Examined the section in the bluffs. The same series of beds are exposed as in the McElmo. Said good-bye to Jackson near the crossing of the old California wagon road and returned to camp. Worked on the geological map.

< August 4th. Moved 14 miles down the San Juan ^{valley in south western} and camped ^{Colorado} within a few miles of our western line ($109^{\circ} 30'$). Passed

*San Juan River. The Indian
camp on the river 1871*



by the ^hmountain of the Montezuma, a deep valley with a dry bed but bordered by many cottonwoods. Met an outfit of Indians consisting of four men and five squaws. The two younger fellows were impudent, devil-may-care fellows. The two older were quieter and more polite. The oldest was a tall, slender man of say 50 years with a sober, composed countenance and a mouth of un-godly width. He shook hands and called me "Hi Amigo," said also that they were Navahoes. They drove some 20 or 30 sheep and goats and indicated that their "wickiup" would be made at the junction of Montezuma and the San Juan. One of the Indians who rode ^{by} to my side asked to see my rifle, which, as usual, was slung across the front of my saddle, but I declined the favor as it might have been a difficult matter to recover it in case he should be tricky. My outfit soon came up and I took them to camp four miles below the ^{mouth} ~~mountain~~ of the Montezuma. Chittenden had crossed at the wagon trail ford and was making a station south of San Juan river. The Indians advised him to "piqua" ^(go to get out) up the river, but Chittenden didn't "pike." The night following was destined to be one of unusual excitement for our party. I was awakened at 10:00 or 11:00 o'clock by a confusion of sounds and the excited inquiries by Chittenden and others as to who could be yelling on the south side of the river. At the same moment my ear caught the hoarse yells of some one apparently in the greatest excitement. I was on my feet in an instant and shouted in



reply. It was Tom Cooper, chief packer. He was yelling, talking, and swearing in the most desperate manner, and I could only make out that something very disastrous was happening and that our help was instantly needed. We seized our rifles and hurried out to meet him in the dark woods bordering the river, and soon learned that we had possibly escaped what might have been a serious disaster. Early in the night as Tom happened to be lying awake in his tent he noticed that there seemed to be some rather unusual disturbance among the mules and presently that the bell began to tinkle as if the bell-horse were trotting or running. The herd was evidently moving down the valley along the river bank. He was up in an instant and after them. Steadily they moved away and presently he followed but found it very difficult to get closer to them. He suspected nothing wrong only that they had been frightened by a coyote or some other wild beast, in which case they would certainly soon stop. Already he had chased them two miles over gorges and rocks, through weeds and brush and it would seem they would never stop. The perspiration was making him blind and his wind was nearly gone. Suddenly the tramp ceased and the bell was silent. He could only keep on toward where he heard the sound last, and to his amazement he discovered the herd just ahead of him rounded up in a close bunch standing quite still in the darkness. He passed around them

thus to turn them back toward camp in case they should frighten. He came within a few feet of the ~~the~~ bunch and coming quite close was about to place his hand on the head of the old bald-faced bell-horse when the horse shook his head and there was no bell, and it suddenly dawned upon Tom that these strange movements were not made of their own will but under the guidance of the band of Indian desperadoes. The explanation came very suddenly. A flash of lightning revealed the crouching forms of two savages, almost within the reach of his foot, engaged in cutting the hobbles from the two hobbled mules. They caught sight of him and at the same moment and were so struck with amazement that they thought only of flight. With a bound they sprang upon their ponies and were off like a shot. Tom, doubtless somewhat paralyzed, did not take to flight but jumping upon the nearest mule started the herd and then led off for camp uttering the most fearful yells at every jump. The red-skins, as they flew up the valley and over the rolling hills must have felt their blood freeze at the very sound. Certainly they did not stop until many miles intervened between them and the scene of their fright. In half an hour our animals were all safe in camp. We could hardly cease congratulating ourselves on having escaped a great disaster - that of being set afoot in a desert 200 miles from the nearest habitation.

August 5th. On the following morning we rode out to the scene of the mutual surprise party and there found the

bell which had been cut from the horse's neck, a pair of hobbles the removal of which had caused the delay that had saved us and the last one entirely freed from the animal which it bound, and also a pair of fine rawhide lariats dropped by the thieves in their sudden retreat.

All ^{at} above were marks and tracks showing what had gone on. We then followed the trail of their animals back up the valley toward our camp and discovered that these two men had walked all the way from their camp four miles above Indian file and that their ponies had been brought around to them through a circuitous trail in the hills. Tom and John rode up the valley and found their camp soon after while Chittenden and I went up on the mesa above to do our day's work. The boys were determined to raise quite a noise in the wickiup of the supposed guilty redmen but felt inclined to give up the idea when they discovered instead of four men seen yesterday, eight fierce-looking devils crouching over a pipe and looking forbidding enough in their sullen, stoic mood. They were neither communicative nor polite, and the two boys came away impressed with the notion, as Tom put it, "that they were determined to give us another deal yet." The audacity of the thieving pirates went ahead of anything we had ever heard of. Not only did they stay all night boldly

in the camp to which we had tracked them but at noon rode boldly down to our camp, dismounted, and set themselves in a half-circle in the middle of our camp and proceeded to scrutinize every object in the outfit, and to beg this and pretend to swap for that. One old scamp had the audacity to nudge me with his elbow and order me to bring a pail of agua or water which I did not do. We treated them as coolly as possible, kept our rifles within reach, and held such manner of powwow as we could. Traded some matches for some arrows and gave them some bread to eat. It appears that they were really trying to find their lariats, and possibly to claim them. We watched them so closely that they failed to steal anything and saw them depart at last with a feeling of relief. These fellows came more nearly up to my notion of what a bad Indian should be than any mortals I had heretofore seen.

Mounted double guard for the night, determined to protect ourselves to the utmost. I think I recognized two of the Indians as the same we met on the 25th of July between the Mancos camp and La Plata mines. That party of four has doubtless been following us since that time and will perhaps be lying in wait until we get out of the Southwest. They are cowardly scamps who would not dare to steal our stock when they could be found out, or harm us personally if it were

likely to endanger themselves. They know that we sleep and eat and work by our needle guns and they move with great caution in consequence. >

August 6th. Moved camp nine miles up the San Juan toward the ford. No Indians in sight. They have moved out on the 5th. Possibly they are hiding in the cottonwood groves below. The valley at the edge of which the mules were recovered seems probably to have been once ascended by Capt. McComb in 18__.

A trail follows it six miles to the source, thence to the north-west across the Mesa toward central Utah. We named it ^{capture} Recovery Creek.

about 30 feet long,
The beautifully painted jars of Buckhorn,
were brought home as fragments of
them are filled with this manuscript.
The rats got at them and cut them
into bits

Our escape was almost miraculous.
Had they occurred, which they came
within 25 seconds of doing - we
should have walked out without our
kit, hundreds of miles.

NINTH ANNUAL REPORT OF THE UNITED STATES
GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES, 1875.

By F. V. HAYDEN

- - -

"The geological examination by Mr. Holmes was fruitful of most important results. His investigations were extended from Colorado into portions of Utah, Arizona, and New Mexico.

In 1874, Dr. Endlich examined the district lying to the east, so that Mr. Holmes took up the work where he left off at 108° west longitude, and carried it without difficulty to 109° 30'. In general, the geology is not greatly complicated. The section of stratified rocks exposed extends from the Tertiary to the Carboniferous, including about 2,000 feet of the former and slight exposures merely of the latter. About 9,000 feet of measures passed under examination. Of other rocks, there are--four small areas of trachyte, one limited area of metamorphic rock, and a few unimportant dikes." (page 6)

"Of the 6,000 square miles, 5,700 are of sedimentary rocks: 230 of these in the southeast are of the so-called lignitic; 800, chiefly included in the Mesa Verde, belong to the Upper Cretaceous; and the remaining 4,900 to the Lower Cretaceous, and such of the earlier periods as are exposed in the crooked and narrow valleys, and about the trachytic groups. In the Cretaceous series, Mr. Holmes examined a number of seams of workable coal, procured fossils in ten distinct horizons, and expects to be able to identify these horizons with such corresponding ones as exist on the Atlantic slope. The section obtained is the most complete and satisfactory made in Colorado up to this time. The trachyte areas include about 250 square miles, and seem to present many remarkable and interesting features.

The prehistoric remains in the canons and lowlands of the Southwest are of great interest, and the study of them by Mr. Holmes was as complete as possible under the circumstances. Many cliff-houses, built in extraordinary situations, and still in a fine state of preservation, were examined. A good collection of pottery, stone implements, the latter including arrow-heads, axes, and ear ornaments, etc., some pieces of rope, fragments of matting, water-jars, corn, and beans, and other articles were exhumed from the debris of a house. Many graves were found, and a number of skulls and skeletons that may fairly be attributed to the prehistoric inhabitants were added to the collection." (page 7-8)

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"The Great Triple Walled Tower, on the McElmo, by Mr. Holmes, is a horizontal model thirty inches square, representing, on a scale of four feet to one inch, the ruins of an exceedingly interesting circular stone tower in Southwestern Colorado."
(page 24)

1875

1876

Work of W. H. Holmes in
Colorado, Utah, and New Mexico
with the Primary Triangulation Party of A. D. Wilson.

o-o-o-o-o-o

TENTH ANNUAL REPORT OF THE
UNITED STATES GEOLOGICAL AND GEOGRAPHICAL SURVEY

o-o-o-o-o-o

Mr. Holmes report on the trip is found in this report on pages 187 to 195.

The following is quoted from Dr. Hayden's introduction to this Annual Report of the Survey for 1876

"In company with the triangulation party, Mr. Holmes made a hurried trip through Colorado, touching also portions of New Mexico and Utah. He was unable to pay much attention to detailed work, but had an excellent opportunity of taking a general view of the two great plain belts that lie, the one along the east, the other along the west base of the Rocky Mountains. For nearly two thousand miles travel he had constantly in view the Cretaceous and Tertiary formations, among which are involved some of the most interesting geological questions. He observed, among other things, the great persistency of the various groups of rocks throughout the east, west, and north,

and especially in the west; that from Northern New Mexico to Southwest Wyoming the various members of the Cretaceous lie in almost unbroken belts.

"Between the east and the west there is only one incongruity. Along the east base of the mountains the Upper Cretaceous rocks, including Nos. 4 and 5, are almost wanting, consisting at most of a few hundred feet of shales and laminated sandstones. Along the west base this group becomes a prominent and important topographical as well as geological feature. In the Southwest, where it forms the "Mesa Verde" and the cap of the Dolores Plateau, it comprises upward of two thousand feet of coal-bearing strata, chiefly sandstone, while in the north it reaches a thickness of 3,500 feet, and forms the gigantic "hog-back" of the Grand River Valley.

"While in the southwest he visited the Sierra Abajo, a small group of mountains, which lie in Eastern Utah, and found, as he had previously surmised, that the structure was identical with that of the four other isolated groups that lie in the same region. A mass of trachyte has been forced up through fissures in the sedimentary rocks, and now rests chiefly upon the sandstones and shales of the Lower Cretaceous. There is a considerable amount of arching of the sedimentary rocks, caused probably by the intrusion of wedge-like sheets of

trachyte, while the broken edges of the beds are frequently, but abruptly, pressed up, as if by the upward or lateral pressure of the rising mass. He was able to make many additional observations on the geology of the San Juan region, and secured much valuable material for the coloring of the final map.

"He states that the northern limit of ancient cliff-builders in Colorado and Eastern Utah is hardly above latitude $37^{\circ}45'$."

*See my report in the Hayden
report for 1876, pages 189-196*

OFFICE OF

U. S. GEOLOGICAL AND GEOGRAPHICAL SURVEY OF THE TERRITORIES

Cheyenne, October 23, 1876.

My dear Holmes:

Your long letter came to hand. I modified it a little and had four copies made of it and sent to as many papers at the same time. Your success has been great and it gratifies me much. Get all the sketches and information you can. Collect fossils if possible. As you come out by way of Rawlins try to sketch the country some, and especially of the mountain just west of Rawlins. As soon as you reach Cheyenne, unless some special reason demands, return as quickly as possible to Washington so that all our work can be put into shape. I am better now but far from being well. My side is better. I shall return soon and have everything ready for the party as they return. I hear of nothing to our disadvantage anywhere. I shall see Bien about the middle of the month and will stir up the work. There were 275,000 people at the Centennial in one day, 75,000 to 125,000 are there daily. Try and get as many notes from Wilson as you can. I wish to get a full summary of the work to be published. Broadcast. Success attend you in everything. I know how splendid your work will be.

Yours sincerely,

/s/ F. V. HAYDEN



Punta de Walfis, Occidente, Cordero



site of a former cliff town, ruins from mica cliffs, New Mexico
 on the Rio Grande, ~~Defiance~~
 Jemez Forest! 10 miles west
 8 miles west of Santa Clara Pueblo

Ruins in the southern
face of the pumice
Cliffs of Puye, New
Mexico, explored by
the School of Ameri-
can Archaeology.



Tree Trunk



a fine example of cliff dwelling masonry
Cliff palace - Mesa Verde





Remains of a large cliff town
Cliff Palace, Mesa Verde



Cliff Palace

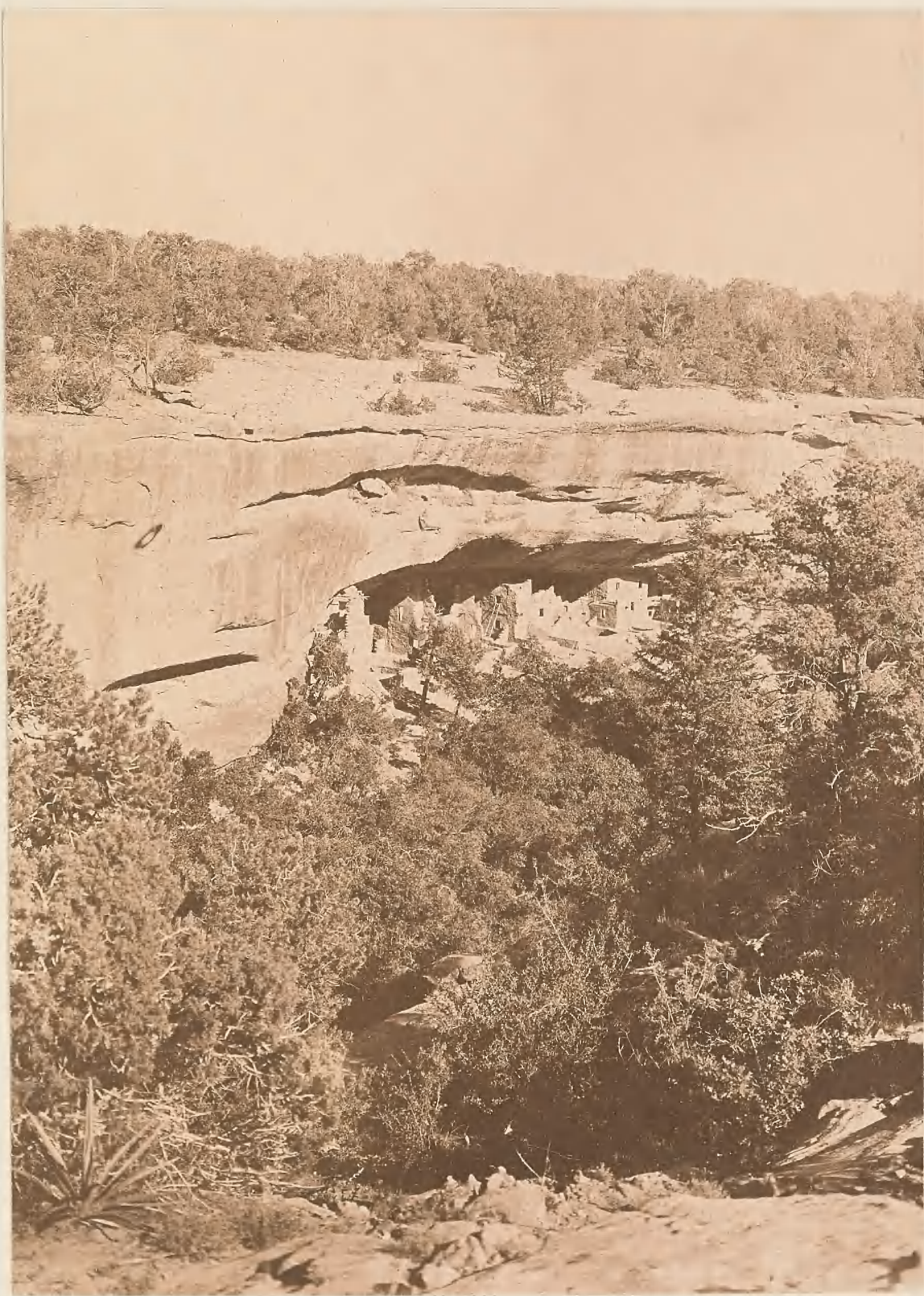


Typical example of well preserved cliff dwelling.
Rio Mancos, Colorado 1914



RWINS

Cliff ruins in picturesque situation
Canyon of the Rio Mancos Colorado,



Ruined houses in a picturesque rock shelter

Cliff Palace mesa near
Spencer tree house



A photograph of a fort built for safety against enemies

Square tower mesa road



Typical cliff dwellings, in ruins, called Casa Blanca -
The whole house, canyon side

RUINS OF "CASA BLANCA"

The White House

This is one of the most striking and important ruins of the cliff groups in the region. It consists of two distinct groups - a lower part, comprising a large cluster of rooms on the bottom land against the vertical cliff, and a smaller upper part occupying a deep recess directly over the lower ruin and separated from it only by about 35 feet of nearly vertical cliff. There is evidence, however, that some of the houses in the lower settlement were four stories high against the cliff and that the structures were thus directly connected. The lower ruin covers an area of about 150 by 50 feet, raised but a few feet above the bottomland, probably by its own debris. Within this area there are remains of 45 rooms on the ground, in addition to a circular kiva. On the east side there are walls still standing to a height of 10 to 14 feet. It is probable that the upper ruin comprised about 35 rooms, which would make a total of 80 rooms in the group.



Cliff runs known as Casa Grande - the white house,
Canyon de Chelly, near the Panguan



285. RUINED CAVE TOWN ON THE RIO DE CHILY, ARIZONA.

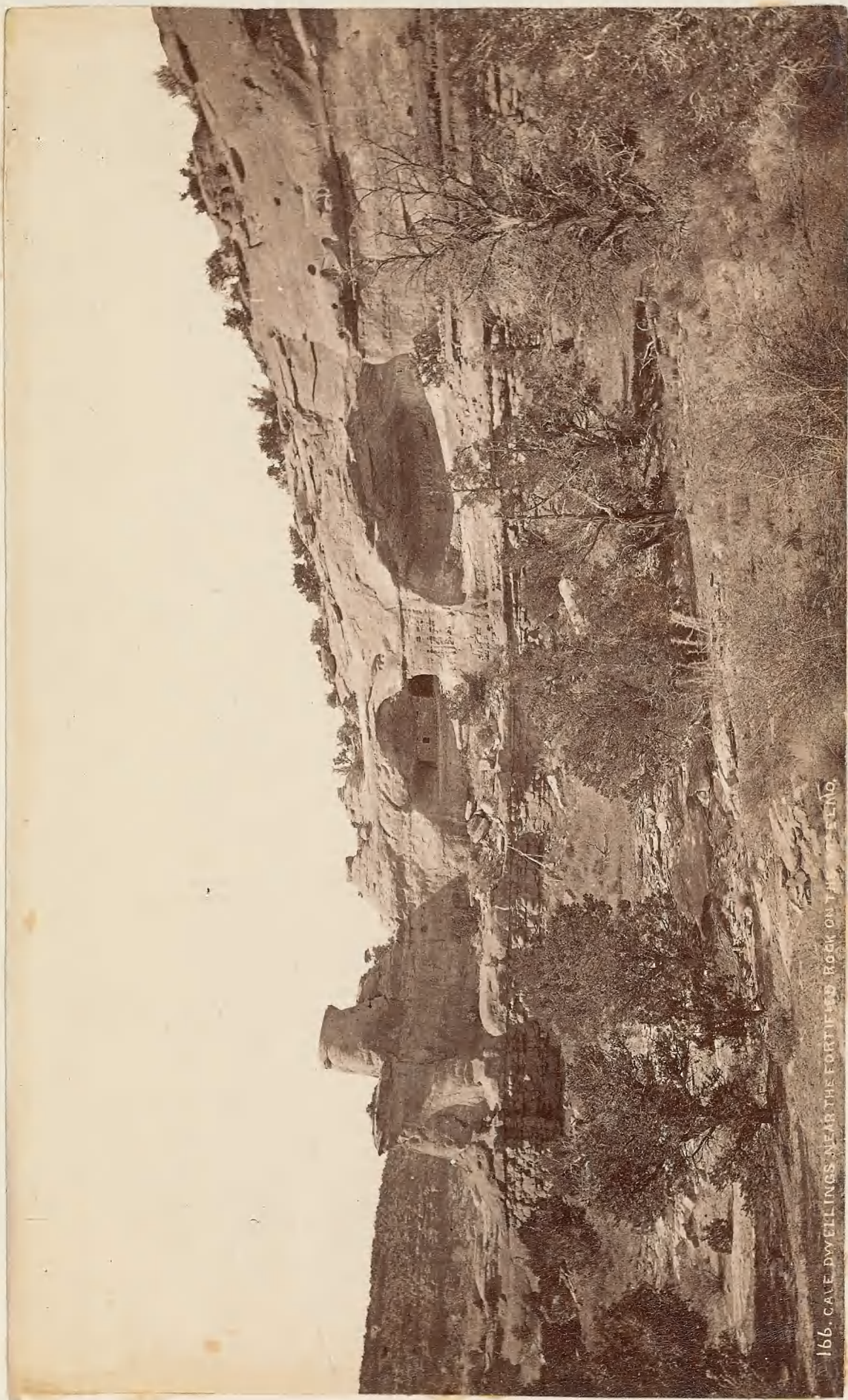
Remains of an extensive cliff village. Jackson photo.



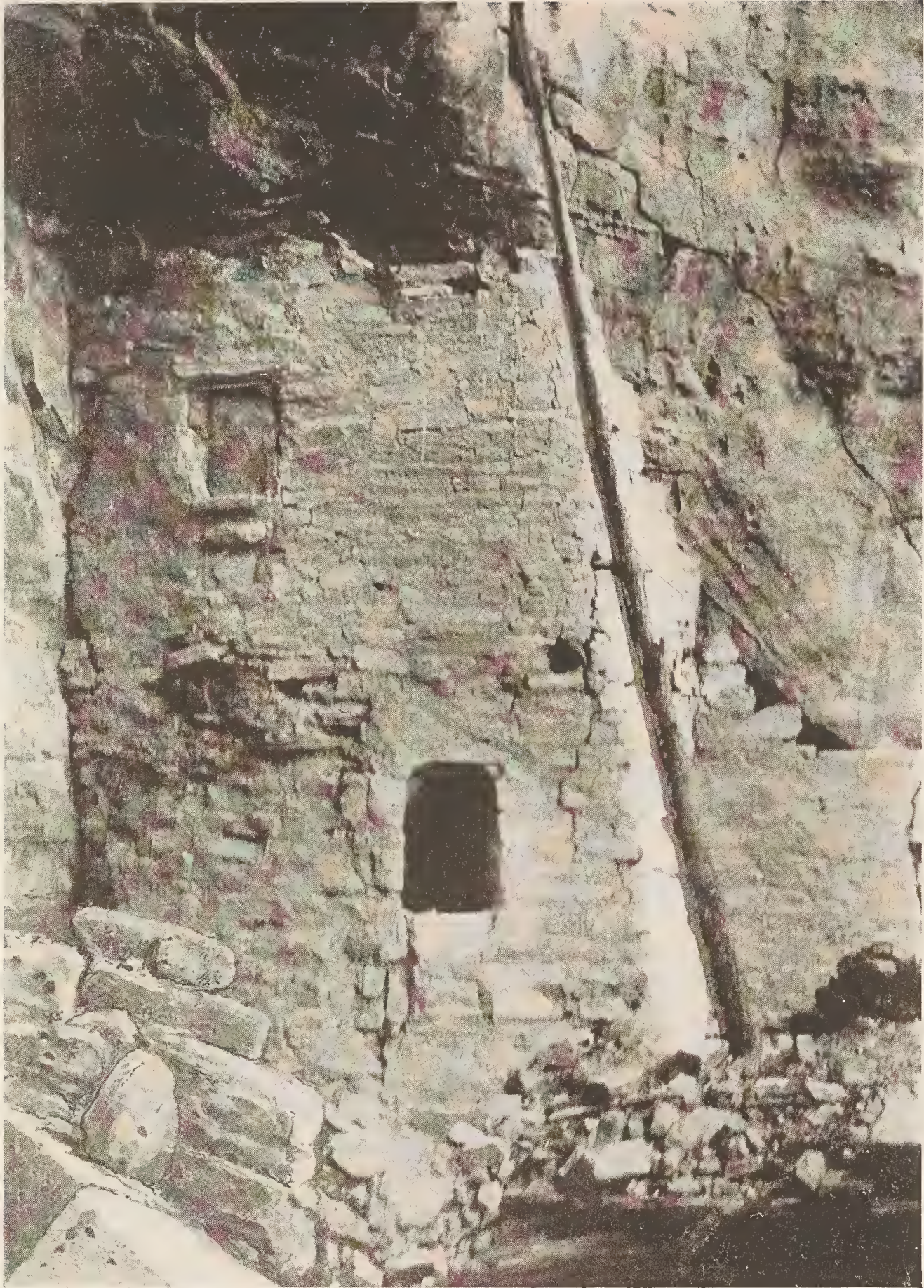
cliff village in remarkable sandstone strata

Chin li wai, Sunday the 10th June

See Kildin & Gundry



166. CAVE DWELLINGS NEAR THE FORTIFIED ROCK ON THE RIO GRANDE.



East Building of Oak-tree House, Mesa Verde National Park, Colorado

(From the William H. Holmes Anniversary Volume)

ART AND ARCHAEOLOGY

are ready to welcome, as did the original ruins a thousand or more years ago, the quick-growing veil of vegetation.

The question of the future of these monuments thus becomes a matter of interest to the whole civilized world. So precious are they to history and science, and so valuable as a material asset to the people of Guatemala, that steps will certainly be taken to shelter them from the dangers with which they are beset. Is it better, in case of failure to take this step, considering impending obliteration, that they should have remained forever entombed in the forest? Certainly not, for the stage of civilization has now arrived in which the historical value of such monuments is appreciated, and their story, so far as archaeological science can reveal it, will soon be written into the literature of the world. This record must be so full and lasting that should the works themselves entirely disappear, the world shall still have, and for all time,

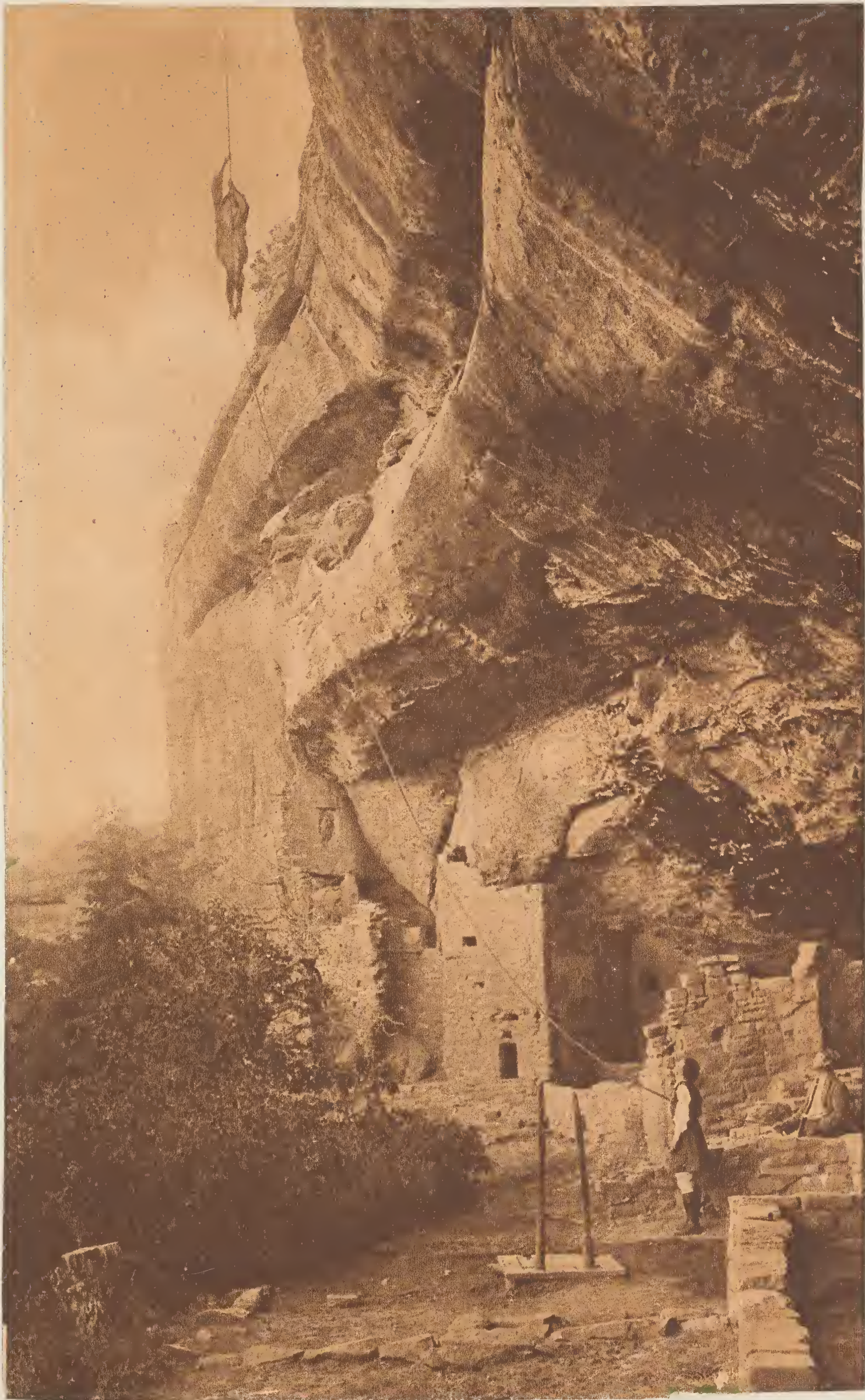
the full advantage of the story. Future generations will, however, hardly excuse the present should no adequate steps be directed toward the preservation of what remains of these masterpieces of ancient American art. Should the extraordinary upper surface of the dragon, shown in an accompanying illustration, continue exposed as now to the elements and to the wear that will come, what must we anticipate will be its appearance after the lapse of a thousand years? The strongly relieved features will be leveled with the general surface and the deep-set eyes lifted to heaven will, from the tears that fill them with every storm, be blind depressions in the roughly pitted surface of a great meaningless boulder of sandstone. As soon as the work of exploration and record is completed, the work of preservation, of covering-in, should be taken up as a national obligation of the republic in whose custody these monuments must remain.

For the article see "Art & Archaeology"





The climb up the great chift-
to Katzemo - enchanted mesa

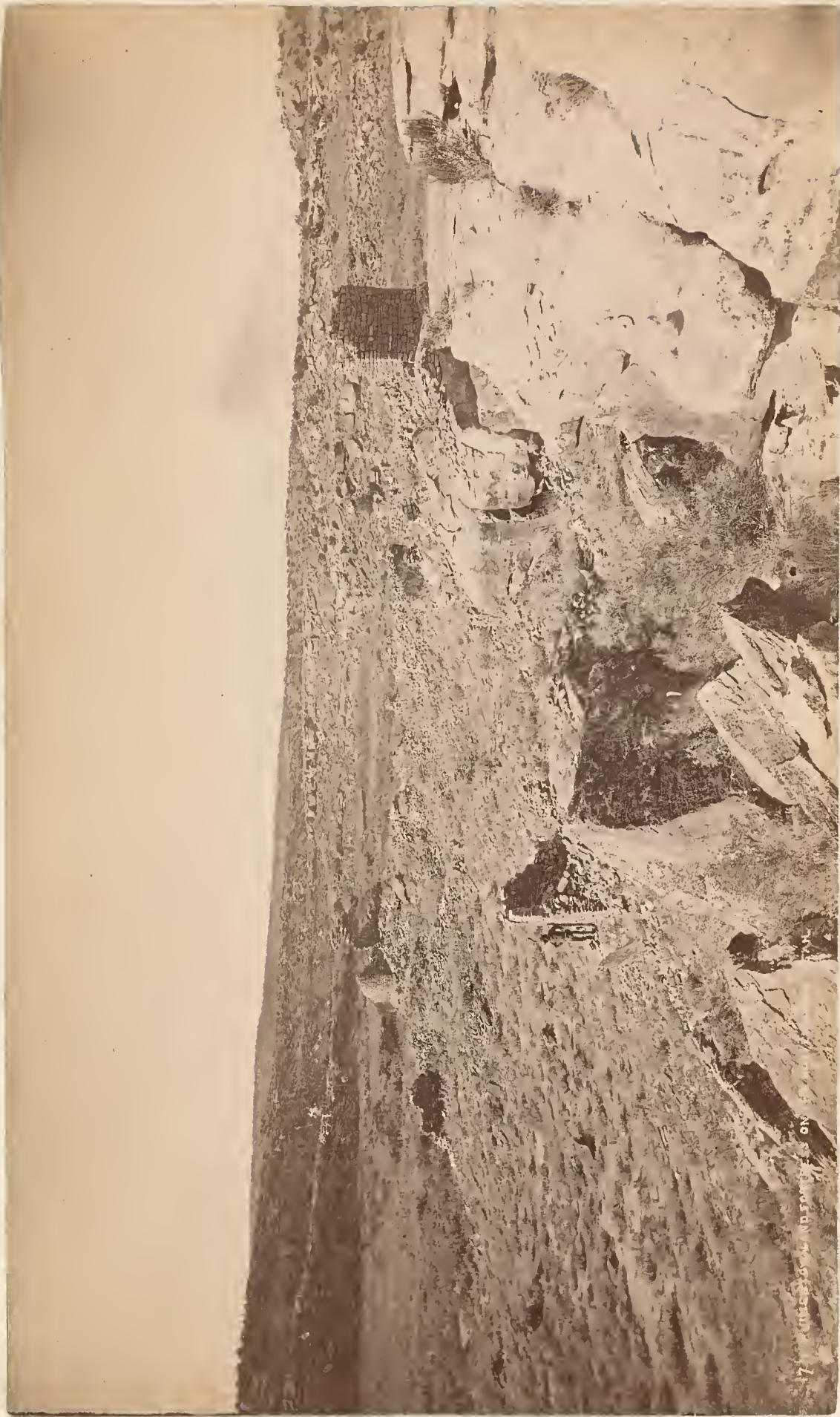


Chaco Canyon N.M. 12-11-1904
man on the mesa



103. ANCIENT RUINS AT THE HEAD OF THE MIMBRES

Wte Mountain in the distance + tower
see model



Characteristic remains of an ancient village,
on the ~~mountain~~ mesa, Utah

Fellow Jackson



Ruin of a Tower or Monument in the site
of an ancient village
near Marassi, Iraq.



A ~~prehistoric~~ ^{pre-historic} rock ruin, or dwelling
 on the Hovenkamp, Cal
 on the edge



172. RUINED FORTRESS ON THE HOVENWEEF MOUNTAIN

Typical village ruin, on the Hovenweef, Utah

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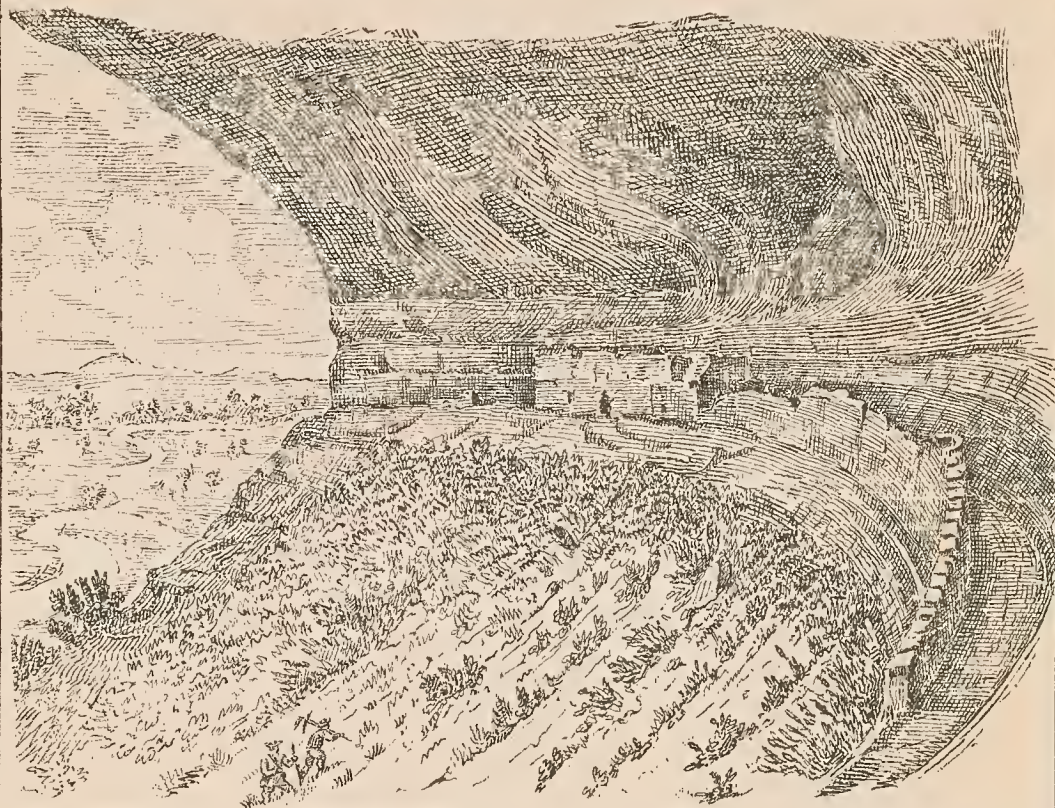
ROVINE NEL BAGINO MEDIO DEL SAN JUAN

secondo disegni di H. Holmes e W. H. Jackson

Sponda destra del R. Mancos
(Colorado)



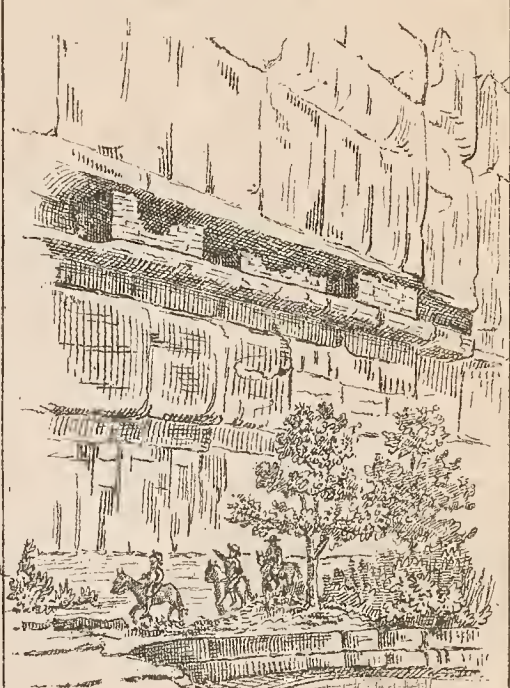
Casa dell'Eco (S. Juan, Utah)



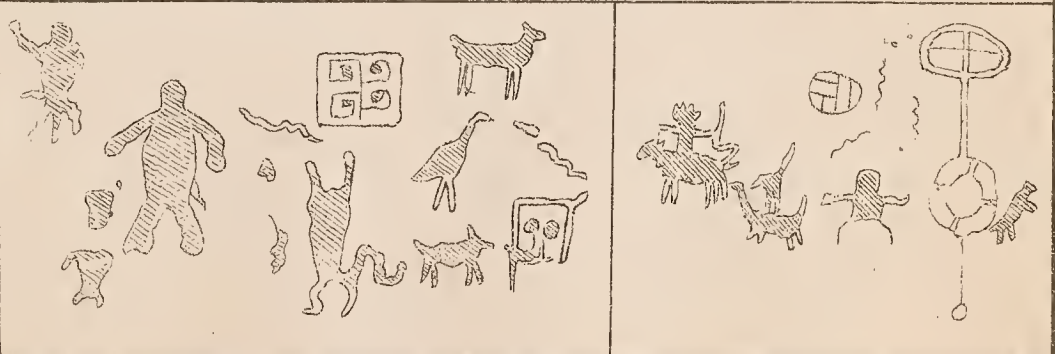
Torre nell'Epsom Creek (Utah)

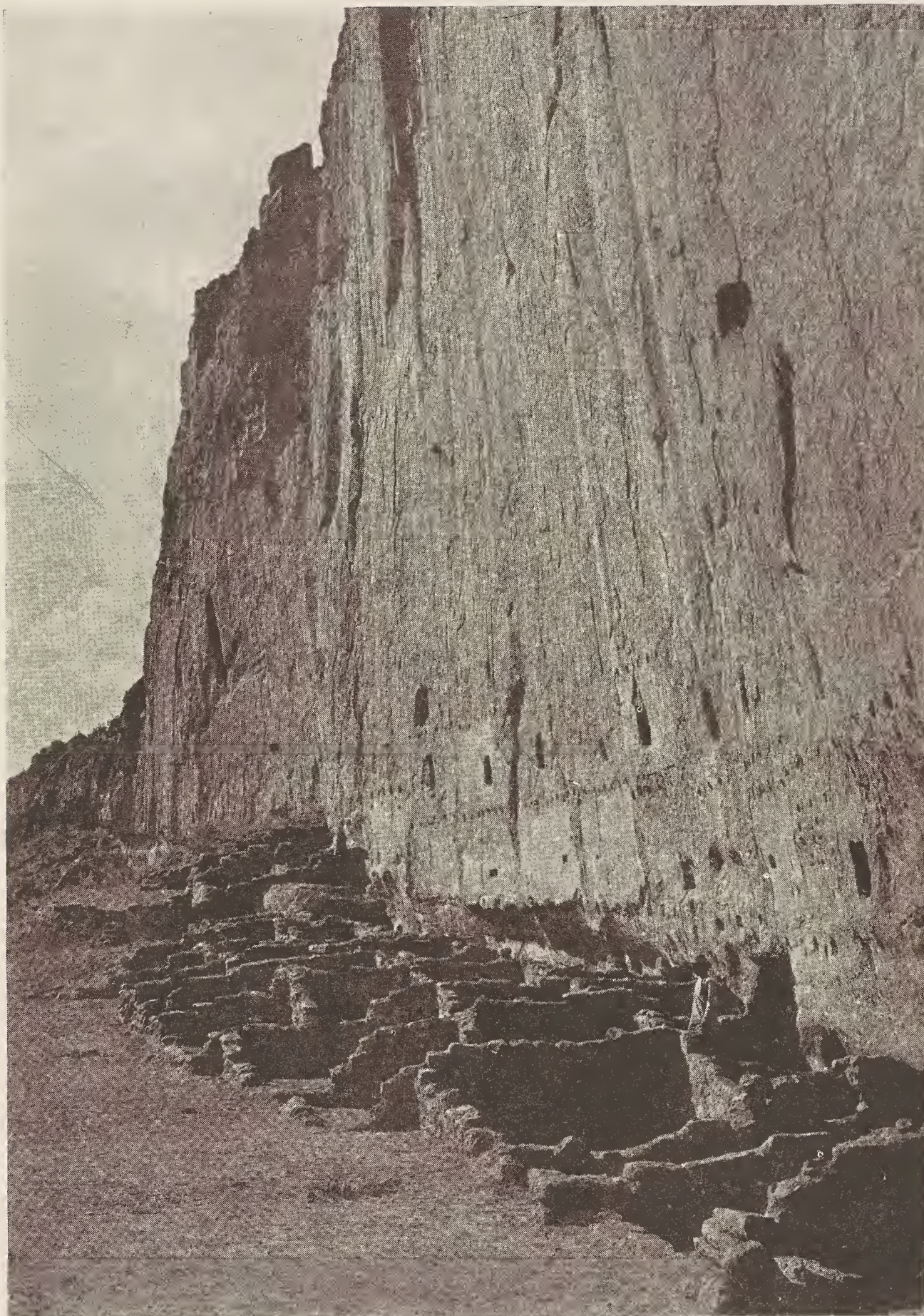


Sponda destra del S. Juan (Utah)



Iscrizioni sulla sponda sinistra del San Juan (New Mexico)





Alone in a crypt in the face of the northern cliff of the Tyúonyi cañon, now known by its Spanish name, Rito de los Frijoles, in New Mexico—the home of an ancient cliff-dwelling people—was found the skeleton of an Indian maiden about eighteen years of age. The body was wrapped in cotton cloth and covered with a robe of fur and feathers. This suggested the poem, "The Cliff Maiden," p. 91.

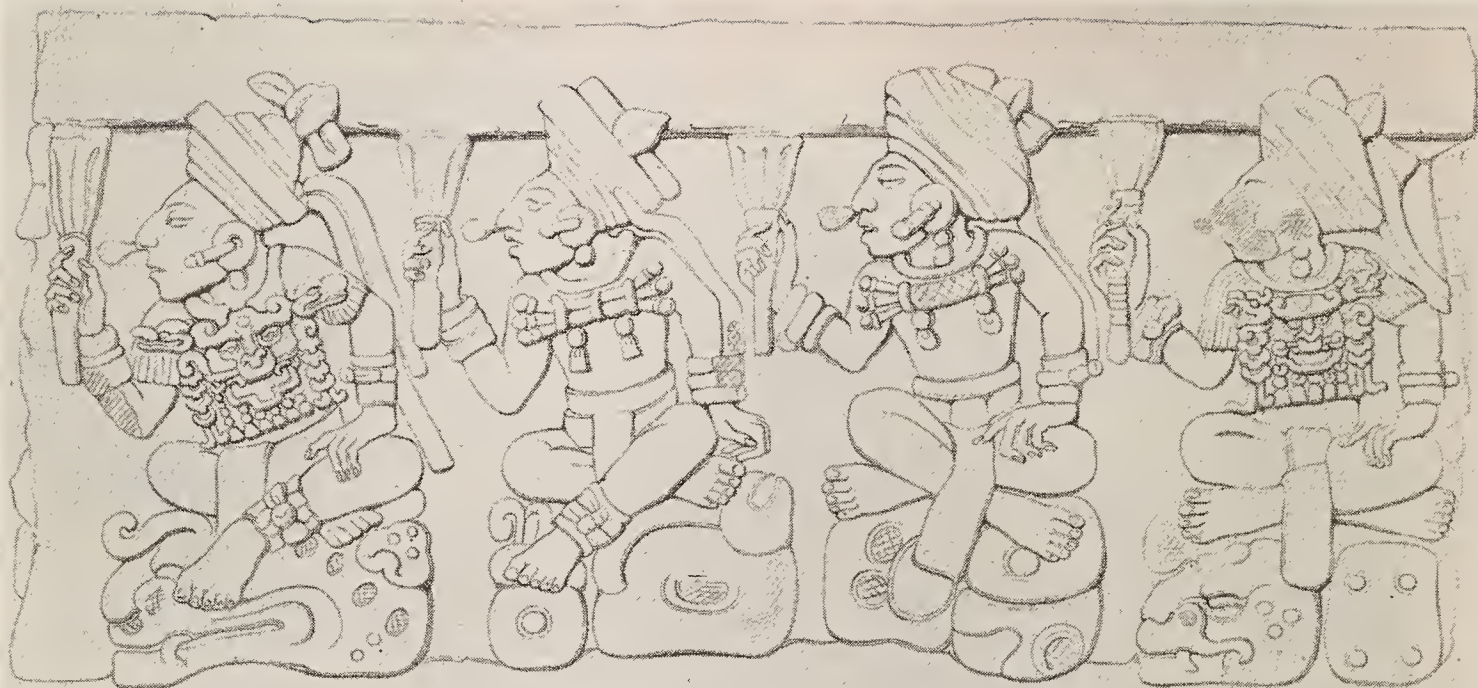


Figure 25.—Sculptured figures of a type employed in the embellishment of ancient Maya temples.

worked out by native sculptors, using life forms with which they were familiar or monsters created by their fertile imaginations.

With respect to the manner in which elements of Asiatic culture could reach middle America in the early Christian centuries—the period of Buddhistic propaganda—it may be said that the sea going capacity of the ships of that period was very considerable, and it is thus not impossible that by design or by accident Buddhistic devotees should have landed upon the shores of America. Neither is it impossible that these devotees of a creed, determined to carry their doctrines to the ends of the earth, should not have coasted eastern Asia, reaching the continent of North America by way of the Aleutian Islands. The journey from Alaska to middle America would be a long one, but not beyond the range of possible achievement for the fanatical devotees of Buddhism. The suggestion that the voyage may have been made by way of Atlantis is deserving of little attention,

and that the hypothetical sunken continent of the Pacific may have served as a bridge is deserving of no attention, since the period of sinking, if it ever occurred, would doubtless antedate the period of man's occupation of either hemisphere.

The writer of this sketch of a vast subject wishes to say in conclusion that he appreciates its many shortcomings, for it is intended to be suggestive merely rather than final; but he finds gratification in the thought engendered by the study, that whereas, but a few generations ago our world outlook was exceedingly limited and our positive knowledge but a hint of the whole truth, the time is fast approaching as a result of the ever widening scope of scientific research when we shall comprehend at a glance the world and its inhabitants, present and past, with the ease with which we now contemplate our local environment or with which we view a story thrown upon the screen.

U. S. National Museum.



Ruins of an ancient Communal Village, Rito de los Frijoles, New Mexico

IV HOUSE-BUILDERS OF THE DESERT

J. P. HARRINGTON

LET us suppose that an enthusiastic anthropologist had been born in the time of the cave-man of Europe, that he had been rich as Crœsus and endowed with a hundred times the longevity of Methusaleh. What more interesting experiment could this man have made than to place on a great, uninhabited continent a few individuals of primitive stock and then watch them multiply and diversify through the centuries?

They spread through mountain, plain, and desert, from arctic coast to tropic forest. Their manner of life and background of thought become, in every locality, different, yet always vary in direct relation to their surroundings. Their language changes until its multiplicity of forms becomes as great a miracle as Babel of old. Social systems, ceremonies, and myths become intricate.

Yet the people still have all their thought centered on their relation to wild nature, they still live close to the earth, they remain primitively human. The whole region becomes divided into more or less definitely marked areas of culture, each peculiar even as regards the minute customs and habits of everyday life and thought.

Would such an experiment not have been interesting both to the ancient anthropologist and to everyone today? But while our anthropologist is a figment of the imagination, the experiment has actually been performed by nature in the great anthropological laboratory of America, and just at the present time it is our peculiar privilege to study and record what has taken place.

All the way from Alaska to Patagonia are hundreds of tribes of Indians



Balcony House, Mesa Verde National Park, Colorado

ART AND ARCHAEOLOGY



Ruins of a Community House, Puye, New Mexico

waiting to be studied. Among them all, however, none are more picturesque and none more worthy of attention than the Pueblos, the primitive house-builders of the Southwest, who still inhabit their several-storied communal dwellings as in the days of the first Spanish conquistadores. These dwellings, blending in color with the desert from which they are constructed, have been modified as little by nearly four hundred years of contact with Europeans as have the inhabitants.

There are still left nearly ten thousand of these Indians, and they inhabit some thirty "pueblos" or towns, everywhere picturesque, primitive, and rich in lore and ceremony. Some of the villages are constructed of adobe brick, others of stone, and the appearance of

those which still have houses of several stories is imposing. The very features of the people and all their actions and surroundings breathe of old, conservative Indian life of times long gone by. One still hears the old languages and dialects fluently spoken in all their pristine richness of vocabulary, and even when Spanish is spoken to the visitor it is the pronunciation of the conquistadores and colonists of long ago.

The Pueblos are, moreover, a very likable and human people, intelligent and kind-hearted. Some individuals among them are able to appreciate the student's attitude as to the desirability of making a record of the Indian life for use in the remote future when not only they but the white man also shall have materially changed and advanced.



Ruins of a Cliff-dwelling Group, Rito de los Frijoles, New Mexico

ART AND ARCHAEOLOGY

Those who have seen much of the Pueblo Indians, even under trying circumstances, have profound respect for their patient and kind dispositions, the natural instinct of hospitality everywhere present, and for their general attitude. If they are reluctant to speak about certain customs, we can but feel kindly toward them for their very reticence, for it is this trait which has enabled them to preserve their customs against influences which deliberately attempt to undermine them.

The old villages, situated beside streams or perched on mesa-tops, show as blotches of warm brown against the snowy fields of winter and bask in the bright sunshine of the summer days. Such a scene means home and homeland to the inhabitants. Each indweller knows every other, and all his relationship, ancestry, and connections; is familiar with all the places inside the village and round about from sacred shrines to goat corrals; and every happening, small or great, needs no newspaper for prompt circulation. Each village possesses almost unlimited charm for the artist, photographer, ethnologist, and those who merely like to become acquainted with the Indian.

Still more romantic is the fact that the Pueblo Indians are the lineal descendants of the ancient cliff-dwellers. Some of the ancestors of the Pueblos inhabited the cliffs so few generations ago that the modern survivors possess definite traditions as to the cliff-dwellings, know their geographical names and what clans inhabited them. Traditions corroborate the conclusions of ethnologists and archaeologists that the dwellers in caves or cliff-houses were Pueblo Indians who were forced to take up this mode of life at various times for defense against Apache, Navaho, Comanche, and other Indian neighbors.

In fact, the Pueblo country can be said to have been inhabited simultaneously by these two classes of Indians of variant culture. The nomads moved around and between the Pueblos, never losing a good chance to attack their more sedentary and agricultural neighbors or to steal their stored-up food products. The Pueblos were certainly a peace-loving people, although probably in former times more warlike than some writers have supposed. The nomadic Indians harassed them constantly, ambushing individuals when they had opportunity and stealing livestock during the period since the latter has been introduced. The Pueblos, on the other hand, cherished a bitter enmity and desire for revenge, and this state of things would doubtless have continued indefinitely if it had not been interrupted by the settlement of the country during the last century. Although the early Spaniards aided the Pueblos against their Indian enemies, the Pueblos have always felt toward the Spaniards as they felt toward the nomads, and even at the present day, although outwardly friendly to the "Mexicans" who live everywhere on farms or in hamlets near most of the Pueblo villages, the Indians really hold them in contempt.

There is every reason to believe that the cliff-dwellings were inhabited at various times by various groups of Pueblo Indians for various purposes of defense, just as these dwellings differ widely in manner of construction. It appears, moreover, that most or all of the Pueblo Indians had abandoned the cliffs at the time of the coming of the Spaniards. Some of the cliff habitations may have been deserted gradually, but the old Pueblo custom of moving a settlement was for the entire population to transfer themselves and

ART AND ARCHAEOLOGY

their belongings suddenly to a new site. Traditions tell of the successive moving of some of the villages from one site to another seven or more times.

The history of the Pueblos in the cliff-dwelling period will some day be clearly brought to light by a careful study of the archaeological remains of the region. Thanks to the dryness of the climate and the richness of the material culture of the Pueblos, and also to the fact that the dead were buried and not burned, the archaeology of the area is satisfactory and is greatly illumined by the study of the surviving Indians.

The history of the Pueblos is better known than their ethnology. The first European known with certainty to have visited the Pueblos was Fray Marcos de Niza, who, accompanied only by a negro, reached a pueblo of the Zuñis in 1539 and succeeded in returning, without mishap, to the south. Enthusiastic over the report of the probable existence of riches, the Viceroy of Mexico ordered Coronado to make an expedition to the Pueblo country in the following year. This expedition consisted of some seventy-five armed horsemen and they visited a number of the Pueblos, even penetrating to the Province of Quivira which lay on the plains to the northeast, and returned to Mexico in 1542. Later, several other Spanish explorers traversed the country, but it was not until 1598 that a portion of the region was colonized by Spaniards and Mexican Indians under Juan de Oñate. In 1680 the Pueblo Indians revolted, killed some four hundred of the settlers and missionaries, and forced the rest to flee from the region. They retreated in a body down the Rio Grande as far as El Paso, and for twelve years the Pueblos were independent of their conquerors. In 1692, Diego de Vargas reconquered the provinces and initi-

ated conditions which closely resemble those that obtain at the present day.

All the tribes which bordered on the Pueblos were familiar with agriculture and practiced it to a limited extent, but it was only the Pimas and other tribes that lived to the south which were agricultural in the same sense that the Pueblos were. In pre-European times the Pueblos possessed corn and beans of a number of varieties, calabashes, cotton, and certain other cultivated plants, and employed a highly developed system of irrigation. The digging of the ditches and work in the fields was communal, and a large part of the Pueblo religion consists of prayers and ceremonies for the purpose of securing abundant harvests. The diet was supplemented by various wild seeds, roots, and greens, and game of considerable variety, and the ways of cooking the food, especially the corn products, are numerous and interesting. So also are the names of plants, and parts of the plants, which oftentimes are very curious. At the present time the daily diet of many of the Pueblo Indians is as monotonous as that of their Mexican neighbors, the same tortillas, frijoles, and black coffee being always present. In addition to the plants which they anciently cultivated, the Pueblos now have all the plants that the Mexicans have and hesitate at eating nothing which the Mexicans or Americans eat, even using introduced food products in their most sacred Indian ceremonies; but these foods must at first have been accepted—as was the case with other tribes—only after a struggle.

In ancient times the only domesticated mammal of the Pueblos was the dog, which is said to have varied considerably in size and color and must have been as numerous and ferocious to the stranger as at the present day.

ART AND ARCHAEOLOGY



Ruins of Balcony House, partially restored, Mesa Verde National Park, Colorado

Domesticated wild turkeys were also allowed to run loose about the villages, and eagles, macaws, and other birds were kept in cages for use in connection with ceremonies. The Pueblos now have all the domestic animals of the Mexicans and keep and work them much as the Mexicans do.

Large volumes can be written on Pueblo pottery, ancient and modern. The art is almost dead at some of the villages, but at others is still flourishing to a surprising extent, and the surviving Indians are still able to interpret the meaning of many of the modern and some of the prehistoric designs. Blanket weaving is practically a lost art at the eastern pueblos, but all the Pueblos in ancient times made cotton blankets and other woven articles of as

good workmanship as those of the early Navaho; in fact, it seems plausible that the Navaho adopted the art of blanket weaving from the Pueblos at an early date. As already said, the material culture of the Pueblo Indian is unusually rich and varied.

It is much easier to write of the sociology and religion of one Pueblo or of one group of Pueblos than of the Pueblos as a whole. One finds everywhere a highly organized clan system which is interwoven intricately with the religious organization. Religious fraternities are numerous, and their medicine practices and ceremonies are kept secret not only from Mexicans and Americans but also from the Indians of the same village who are not members. Although women belong to some of the fraterni-

ART AND ARCHAEOLOGY

ties, many of the women of the village know very little about religious matters, but have the idea that a full knowledge of these things is possessed only by certain men. Ceremonies of various kinds are almost constantly going on, and each village has also its "fiestas grandes," or great festivals, which are attended by Indians from other villages. The chief priest or priests of a village are designated by the Spanish term *cacique* and spend much of their time in prayer and fasting for the good of the people. There are religious ceremonies performed at birth, puberty, marriage, and death of the individual, all of them highly symbolic and of deep meaning to the people. The use of sacred meal, fetishes, feathered sticks, certain dancing regalia, and of religious chambers known as kivas, is largely peculiar to the Pueblo culture.

A comprehension of the cosmographi-

*School of American Archaeology
Santa Fe*

cal ideas of the Pueblo Indian shows that they were very different from our own. It is believed that there were other worlds above and below this and that the first people lived in the lowest world, whence they found their way up as through the various stories of a house into this living place which the Sun Lord lights. The spirits of the dead are believed to go to a ceremonial chamber known among some of the tribes as Wáyima, where they dance. The unwritten mythological literature of the Pueblos is large in quantity.

Voluminous records of the Pueblo Indians will be of great scientific value, but, however carefully they may be written or studied, the impression received from reading them will not be the same as that gained by the Indian himself, who sees the life of his people from childhood up with Indian eyes and understands it with an Indian mind.

A MAYA MONOLITH: THE FIRE-PRIESTESS

How calm her eyelids, and how pure her lips,
Parted in benediction that reveals
A sovereignty that springs from knowledge deep,
Not knowledge that all men proclaim her power,
Her crown, her scepter, shoes, do not divine,
But the soft breath that streams unseen from her,
This, this it was that urged her toward the Sun,
With this her chant invoked, her mouth proclaimed,
By this her message triumphs over stone
Through this her body bore the burning grace
Of stellar wisdom that informs her face.

BEATRICE IRWIN

Book them up

Model of a Cliff Dwelling called Mummy Cave Ruin, Northeastern Arizona.

2 v. 100

Mummy cave ruin, called by the Navaho Indians Tseiyakin, was so named because the mummy of an infant was found in it. It is situated in Canyon del Muerto, a tributary of Canyon de Chelly in Northeastern Arizona.

The inhabitants of this cliff dwelling were ancestors of some of the clans now living among the Hopi Indians, the habitation having been deserted in comparatively recent times.

Mummy Cave Ruin lies in the shelter of two recesses about 300 feet above the bed of the stream, and consists of two sections, an eastern and western, connected by a ledge 110 feet long by 20 feet wide. The eastern recess is about 200 feet across and 100 feet deep; the western about 100 feet across and 75 feet deep.

The western section is inaccessible except by the connecting ledge which is approached from the east. Its ground plan shows from fourteen to twenty-five rooms. A row of ten rooms can be traced on the connecting ledge which is wholly occupied by these buildings. The eastern section contains the most rooms. The majority are rectangular in shape, but there are three or four circular rooms that are identified as ceremonial chambers and may be called kivas.

The rooms of the eastern part number about fifty, which, with those in the western section, make a few less than ninety. The majority of these were habitations, but many were for storage, and some served as granaries. A few of the eastern rooms stand

three stories high and have their roofs still intact. One of these chambers, which resembles a tower, has beams projecting from three sides.

The rooms of the western part are comparatively large and are evidently habitations; those of the ledge range from 10 to 15 feet wide. Some of these were formerly more than one story high. The front wall, now much broken and buried under fallen masonry, was exceptionally massive. It formed the outer border of the plazas and served as a retaining wall, rendering entrance into the cliff-dwelling impossible except at certain places.

The ceremonial rooms, or kivas, are enclosed in rectangular chambers, their tops being at the same level as adjacent plazas. The entrance was by a ladder through the middle of the roof which is now destroyed. Each kiva had a ventilator by which fresh air was introduced at the floor level by means of a vertical passage opening in the plaza. The wall of one kiva was decorated with a white band on which was painted a meander design colored red. Scale: 5 feet to 1 inch. Modeled by Cosmos Mindeleff.

THE SCOPE OF ARCHEOLOGY.

History as it pertains to man is a comprehensive all-embracing term, and archeology may be defined as that phase or part of history which deals in a scientific way with the phenomena of art - material and immaterial, the history and significance of which having been partially or wholly lost must be completed, interpreted or determined by research. Regarding history as all-embracing there can be no such thing as prehistory, a prehistoric period, or prehistoric archeology. There can be no definition of history as a whole on a time basis. We may think of a single people as having an historic period, a period dating from the beginning of writing among that people; we may think of a people without writing which has a part in the written history of a neighboring more advanced nation, but the archeologic

phase in neither case ceases with the beginning of the written phase of the history of these peoples, a large part of the history of each being unrecorded passes at once into the realm of archeology.

Although no definite separation can be made, there may be distinguished arbitrarily for convenience of presentation a written and a prewritten phase of history; the former relating to the past of peoples whose history is known more or less fully historically, much of which, however, can be known only through objective evidence not written into books -- evidence which must be dug from the ground or brought forward from a multitude of forgotten hiding places. Thus the history of Rome is recorded in a thousand volumes, yet there is much more of historic Rome that can be known only to the

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ETWEEN
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HISTORIC
ROME.

modern world through excavation and research. Pre-historic Rome covers a succession of periods extending from the dawn of history indefinitely backward toward the beginning of man's career on the shores of the Mediterranean. Even a modern city like Washington, for example, now not two centuries old, has a record of events entombed beneath its pavements awaiting the archeologist of the future. Resting upon a substratum filled with relics of the aborigines, the subject in recent years of extended and important research, is a layer of deposits pertaining to the British colonial regime and a stratum superimposed upon this filled with traces of a century and a half of the modern republic. It would seem thus that the capital city has its unwritten record to which the historian of

PREHISTORIC
ROME.

PREHISTORIC
WASHINGTON.

the future may, however, not need to apply, since the written record is exceptionally complete unless, indeed, a fate like that of ancient Rome should, in the fullness of time, fall to her lot. Apply to America the contents of an ancient village site in Asia Minor, for example, deserted before the beginning of the Christian era, containing ruined buildings and other works as well as minor relics of various kinds on and beneath the surface. All of these antiquities are properly within the perview of the archeologist who uses them in determining people, culture, period, relations, and origins. The contents of a village site deserted by a primitive tribe in Arizona a generation ago furnishes nearly identical remains, all of which are equally well within the perview of the student of archeology who may use them in determining the people, the culture,

period, relations, and origin as in the other case.

The period does not in any way effect the character of the archeological status.

DIRECTOR'S REPORT, 1928

APPENDIX I

THE STATUS OF ETHNOLOGICAL AND
ARCHAEOLOGICAL RESEARCH IN
THE SOUTHWEST

The foundations on which southwestern ethnology and archaeology have been built were laid in the last quarter of the nineteenth century. It is true that valuable reports were written prior to that time but nothing that would afford the basis for a substantial scientific structure. William H. Holmes was the founder of the science. (Southwestern ethnology and archaeology are simply chronological aspects of one science). He prepared the way through his geological studies in the Southwest and then proceeded with his masterly interpretations of the remains left by man. He wiped out the mythical ideas of "Vanished Races," demonstrating that the ancient cliff dwellers were the Pueblo Indians of the centuries preceding the European occupation. We owe it to him that students of man now concede that the archaeology of the American Southwest is mainly the early history of the Pueblo Indians. It is regrettable that there is still need for some clarification. A veil of false mystery shrouds these regions in the popular mind. The special writers want buried cities and sepulchres comparable to that of Tutankhamon and create them for the public if the archaeologist will not. The belief is still too prevalent that distinct races flourished on and long ago vanished from the American continent. The public has never accepted the fact, and archaeologists have not made it clear that the Pueblo Indians of today are the surviving remnants of ancient communities who built no cities and who left no tombstones or sarcophagi. In some respects the science of American archaeology is still in the romantic stage. The service done by William H. Holmes, in setting the students of early America on the right road has steadily continued for half a century. He has stood out against the acceptance of paleolithic man in America on insufficient evidence and has set a standard of scientific exactness that enables us to avoid some of the pitfalls that abound in archaeology.

Science Finally Sets Date of Pueblo Glory

Civilization of Indians Flourished in 1067, Searchers Learn.

The curtain which has hidden the most baffling riddle of pre-Columbian history of the United States—the dates of the building of scores of important Indian ruins of the Southwest—has been torn away by the National Geographic Society. It is just announced, thereby effecting one of the greatest scientific discoveries of the year.

The key to the problem was the tree-ring calendar, together with the sun spots, dating back 1,200 years to 700 A. D., when even the most advanced scientists and explorers didn't even suspect the existence of the vast American continents.

The quest has been the work of years, involving two series of expeditions, and including the study of 5,000 cross sections of living trees and timbers in the ruins of what constitutes probably the oldest Indian settlements in this country. The civilization of the giant apartment houses at Pueblo Bonito, New Mex., and at many other historic Indian ruins has long been known, but archeologists have never heretofore been able to answer the question: "How old is it?"

The variation of rainfall in the arid Southwest caused such marked differences in the tree rings that "certain sequences of years became easily recognizable from tree to tree, county to county, even from State to State," according to Dr. A. E. Douglass, who headed one of the exploration parties.

"Just as the far-famed Rosetta Stone provided the key to the written



NEIL M. JUDD.

mysteries of ancient Egypt, so the collection of an unbroken series of tree rings has made clear the chronology of the Southwest," Dr. Douglass said.

"These researches have provided the beginnings of a continuous weather chart for 1,200 years. Through this work we have learned of some of the outstanding events in America which were contemporaneous with the conquest of Spain by the Moors, and we know that certain Pueblo Indian settlements were enjoying their golden ages when William the Conqueror faced Harold the Saxon at the Battle of Hastings.

"The earliest beam we recovered from Pueblo Bonito was cut A. D. 919 from a tree that was 219 years

CONTINUED FROM PAGE 1.

old when cut. Pueblo Bonito had reached its golden age in 1067 and was still occupied in 1127."

In many instances, Dr. Douglass report points out, one group name is applied to several ruins. The "talkative tree rings" enabled the explorers to date each ruin of the group studied. Thus, in the Mesa Verde group, Cliff Palace is dated 1073; Cave Tree House, 1112; Spring House, 1115; Balcony House, 1190-1206; Square Tower House, 1204, and Spruce Tree House, 1216 and 1262.

Speaking of the tree-ring calendar Dr. Douglass said: "The method which we have used in extending the historical calendar to the Southwest is the outcome of a long attempt to read the diaries of trees. A tree is not a mechanical robot; it is a living thing, and its food supply and adventures through life all enter into its diary."

The influence of sun spots on weather has long been admitted; hence their effects are registered in trees.

Dr. Douglass found in Arizona pines evidence of an eleven-year spot cycle for 500 years, except for an interval from 1650 to 1725. Puzzled at first, the explorer was gratified later when an English astronomer who was unaware of this finding wrote him that there were no sun spots between 1645 and 1715, thus establishing conclusively the accuracy of the tree diaries.

The second series of expeditions, divided into eight groups, led by Neil M. Judd, were occupied chiefly in uncovering hundreds of art objects, household utensils, and ceremonial paraphernalia by digging up the ruins of Pueblo Bonito in the Chaco Canyon.

In commenting on the significance of the discoveries, Dr. Gilbert Grosvenor, president of the National Geographic Society, said:

"A collateral finding of great interest yet to be developed is the possible relation between the weather cycles clearly revealed in this tree-ring calendar of the southwestern United States and similar cyclic variations being recorded by a third National Geographic Society expedition (in conjunction with the Smithsonian Institution) on Mount Brukkaros, Southwest Africa, making daily observations of solar radiation."

CONTINUED ON PAGE 4, COLUMN 4.



My A Tent 1875

W. H. Holmes

Mountain Tent

NEWLY EXPLORED VALLEYS.

**The Chances for Stock Ranges in
South-Western Colorado --- Places
Where the Grass Grows Knee-
High---And Regions That are
Struck with Sterility---
What the Hayden Ex-
pedition Found.**

[Special Correspondence of the News.]

PARROTT CITY, Col., September 4, 1875.—

Our work has carried us all along the southern border of Colorado, from the mouth of the Animas river west, and have reached over fifteen miles into New Mexico, thirty miles into Utah, and also a corner of Arizona, fifteen miles by thirty in extent, while, of course, the main body of our work has been within the limits of Colorado.

As we marched from Denver south and west, and especially from the Huerfano to Del Norte, we were constantly reaching ranches and stock-men, curious and interested in the character of southwestern Colorado, and looking toward it as a probable rich winter range, as the eastern parts of the territory get over crowded. The glowing reports of the rich Animas Valley had justly encouraged them in this, and made them expect equal richness further west, in the more unexplored parts.

As we left the Rio Grande, and marched by the Indian trail over onto the headwaters of the Pinos, and thence southwest onto the Piedra, we found a broad, rich valley, at an altitude of, perhaps, 7,500 feet. This valley is nearly or quite ten miles long, and generally two miles wide, and is all, I think, within the limits of the purchased portions of the Ute reservation. This particular valley of which I speak—the first open park from the headwaters of the Piedra—may, from its nearness to the mountains, be overlaid with snow during the winter; but further down the stream there are, likely, equally fertile parks not liable to this danger. Mr. Wilson, working through this district, can make better estimates.

West of the Piedra, the next open valley is on the Rio Pinos, near the junction of the two main forks; a valley of about the same size as that of the Piedra, perhaps a little less rich in grass, but eminently well fitted either for farming or stock raising. It is also within the limits of the San Juan purchase; has an altitude of only 7,200 to 7,600 feet, and, being further from the mountains than the Piedra Park, is much less liable to snow. Further west, and still above the southern limit of the purchase, we struck the Florida Valley. It is much narrower and more broken than either of the others, and, though containing considerable grass, it contains it in patches only, and would not support so many cattle as those valleys further east. There are two or three cabins already on the Florida, but at present unoccupied.

The next valley west is the great park of the Animas. So much has been already told and written of it, that I need say nothing more, but that its altitude runs from 6,500 to 6,800 feet, that it is of fertile soil and quite mild climate, and that already most of the best sites are settled upon.

The next river to the west is the La Plata. At its head, Captain Moss is settled with his Californians, working the mines. There are,

at present, forty or fifty men engaged. The grass around their camp is rich and abundant for a considerable distance, but the altitude—about 9,000 feet—is too great for any possibility of a winter range. From the mines the river falls very rapidly, and twenty-five miles down there is very little winter snow, but here or below them is very little likelihood of settlement being allowed, for the Indians are carrying on farming operations in the river bottom land, and range their own stock on the terraces above.

Further west still comes the last one of the San Juan tributaries—the Mancos. This river cuts directly through the Mésa Verde in a cañon from 1,000 to 1,800 feet in depth. All its length, from the head till its entrance to the cañon, is within the purchase, and abounds in grass, but all too near the reservations and at too great an altitude for a winter range. There are already several excellent ranches taken up upon it, and one is being farmed very successfully, vegetables of most excellent quality being raised. Aside from one band of sheep, there is at present no stock north of the upper Animas valley, and within the San Juan purchase no winter range, though a considerable area of good summer range. South of the limits of the purchase, clear past the Colorado line and clear to the San Juan river, there is evidently very little snow, and, outside of the rivers themselves, there is absolutely no water in the summer season. In the triangle enclosed between the San Juan, the La Plata, and the Mancos, there lies an area of at least eight hundred square miles in which we have been unable to find a single drop, while west of the Mancos there is an area of at least 2,000 square miles, with only four or five pools or springs. Within this area are stream-beds thirty, forty, and even sixty miles long, that are perfectly dry, and great stretches of broken sage plain without a tree and with hardly a handful of grass. In such a country there are, of course, few Indians, and they are, of course, bunched about the springs and water holes. Within this latter area there are considerable broadenings in the valleys and open spaces in the mésas where grass may be found, and where, in the winter time, water would be less scarce than now, while the right of herding stock there in the winter might be probably purchased from the Indians at a quite reasonable rate. The grass area is altogether quite small, and even if it were not, the Indians would be suspicious of many white men coming in, and refuse them admission.

Besides the country I have already mentioned, there remains the San Juan river and the area within reach of it on either side. Below the river the country is thoroughly taken up by the Navajoes. This side seems very little ranged by Indians of any tribe, and, while it has broad acres capable of irrigation and cultivation, there is very little grass. The low country being generally covered with weeds and a kind of low grease-wood—there is no sage brush. As in the other dry country I have mentioned, this San Juan border has spots of good grass, but, on the whole, it is decidedly no stock country. Sheep would do better than cattle. That I am not alone in this opinion is proved by several stockmen, who have this summer been down through here in search of winter range. To a man they agree that there is no good prospect.

Further north the same rule holds. Mr. Gannett tells me that low enough down to be clear of snow, there is very little grass, while along the base of the mountains, and on the plateau slopes, there is most magnificent summer range. This is certainly the case on the Dolores, where we have been for the past two weeks. We found there, on the high mesas, great areas of knee-deep grass, and the river bottom full of pretty, open, grassy parks; it is all through buried in snow during the winter.

I have made this letter up entirely of the stock prospects of this district, for I found so many Colorado men interested in the region, that it seemed worth while to impart the impressions the country had made upon me. The best parts of Colorado are, I think, already known.

C. B. C.

*Possible
drillenden*



My mule



pearce

garnett

glenn

after the war

Reals

James

Alkinson

1875

Copy of letter to Mrs. Holmes

Camp on the San Diego, N. M.
(1875)

My dear:

I wrote you last from Bernalillo about three days ago. I am now in this mountain camp fifty miles from the R. R.

I found that the tent which I saw at the Station contained only one man who had been left to carry me in a "buck board" to camp. The ride was terrible - first through barren hills and sand hills where the sun shone hotter than I had ever heard of, then in the afternoon and until night over mountain roads so rough that I wondered that a wagon should be drawn over them at all. We reached Jemez Hot Springs at dark and I was so sick that I ^{car}through up all the vile "grub" I had eaten during the day. On Sunday morning we went into camp a little farther on. The location is extremely pleasant - shut in by hills and plateaus 1500 feet high and surrounded by fine forests of oak, pine, cottonwood, etc. A mountain torrent rushes by and with a roar that recalls the high mountain camps of former years.

The folks are talking so hard that I hardly know what I am saying. I am tenting with Prof. Thompson. Next us on one side is the Stevensons tent and the Madam (Mrs. Stevenson) is out in front in a camp chair chatting with everybody. On the other side are the tents of young Davis, Rob. Chapman and others - Chitty, young Stevenson and Commissioner Black's son - who is "sick-ahead". We are taking it pretty easy awaiting the arrival of Powell. There is a ruin on a bluff near by and I have been exploring that, and yesterday I climbed a mountain about 1000 feet high to get a look at the

country. Tomorrow I think I shall go up into the mountains with Davis and spend a few days. Thompson is going to Montant^a tomorrow and the Stevensons are to go to Albuquerque for a week.

I am feeling first rate and shall enjoy the season, but I would rather be with you and the babe at home. I may get a letter from you soon. It is now eight days since I saw you and have only had the one letter - the one you handed me on my arrival at Lushes. I think of you and the kid very often. With much love to you and him and kindest regards to your mother, I am as ever yours

Will



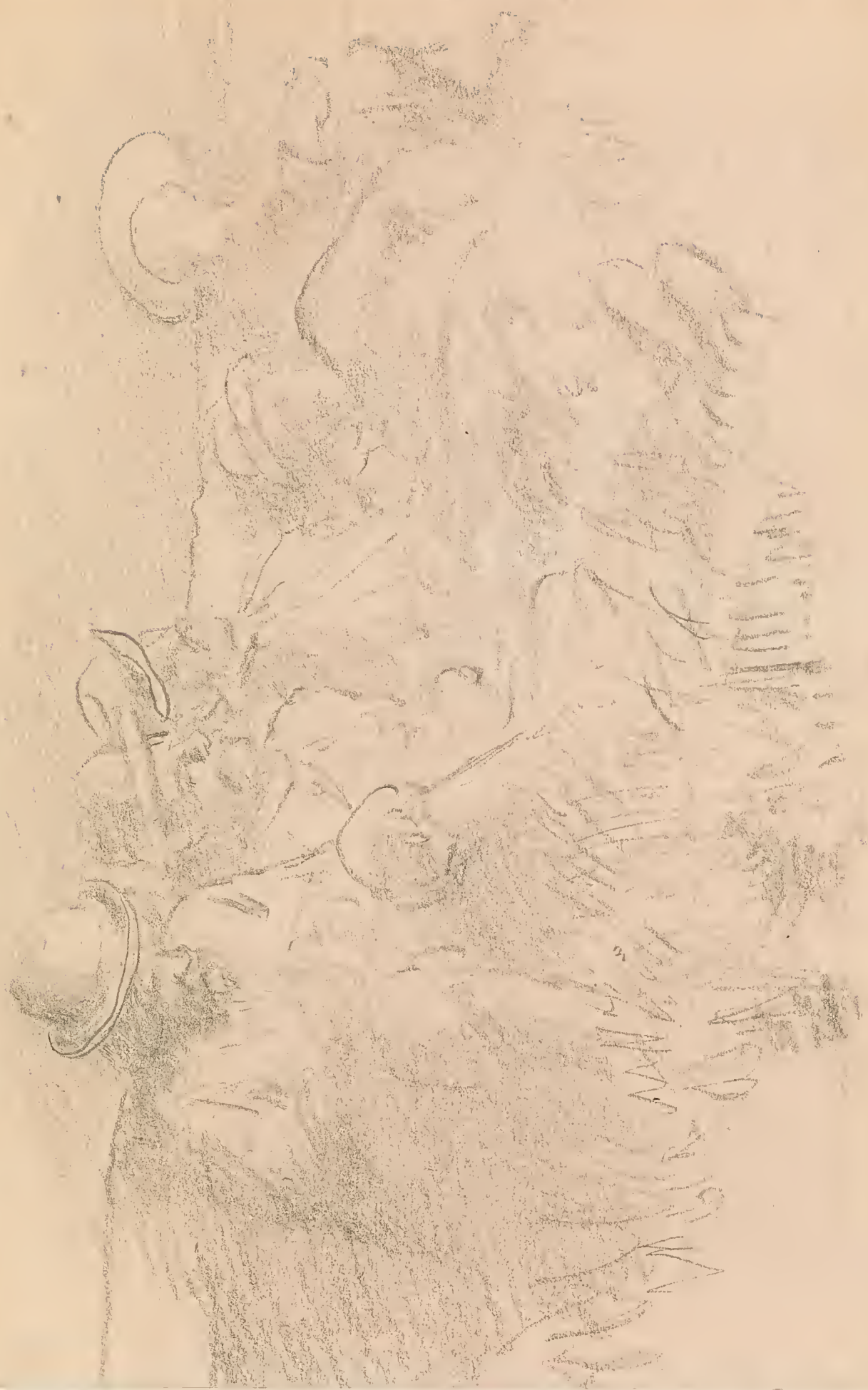
The Cook

1873

1012



Miners' Cabin



10/11/11

Basking in the fire light
Camp on Eagle River Colorado
1873

Brookland

(Copyright, 1907, by John Elfreth Watkins.)

THAT our popular notions concerning the Indian are largely lamentable fallacies, disseminated by the novelist, poet and historian, was emphasized to me the other day in the course of an interview with Prof. William Henry Holmes, chief of the bureau

William Henry Holmes, chief of the bureau of American ethnology. This bureau is supported by the government, but administered under the guardianship of the Smithsonian Institution. Its function is the classification and study of the aboriginal tribes of the United States, and the able man at its head is a geologist, anthropologist and archaeologist. He has done scientific work under the Smithsonian for the past quarter of a century; was professor in the Chicago University and head curator of anthropology in the National Museum before being appointed to his present position to succeed the late Maj. J. W. Powell. He has made archaeological studies in Mexico, California and many other parts of the country, and in 1898 he received the Loubet quinquennial prize of \$1,000 for the excellence of his archaeological work. He is curator of the National Gallery of Art, is a well-known watercolor painter, and his works have occupied places of honor in the most important art exhibitions of this country.

His characteristics which would most impress an interviewer are his conservatism, his intolerance of error and his indefatigability in searching for truth.

I asked Prof. Holmes to sum up for me in popular language what his bureau had learned to date concerning the real Indian—how he came here, whence he came and when he came. I asked him also to correct the most egregious errors concerning the Indian which corrupt the popular mind, and to speculate as far as he could concerning the future of the fast-vanishing red man.

Origin of the Indian.

"Did the Indian probably originate on this continent? Was there a cradle of the race here—an American Garden of Eden, so to speak?" I asked at the outset.

"The theory that the Indian originated on the American continent has been supported by a number of scientific men," he replied. "Some of them go so far as to hold that the Indian developed on this continent from some form of ape; but this is discounted by the fact that America has no existing species of the higher quadrupeds, and that no fossil remains of apes that could have been ancestors of the human race have yet been found here. Moreover, the more we study the red race the more we note not only that they take high rank as compared with the races of Asia and Africa, but that their physical and mental make-up is so nearly identical with that of the higher races of the old world that theories of separate origin seem entirely unreasonable and untenable. My opinion, therefore, is that they spread to America from the old world."

"How did they probably come?"

"You will see here that nature offered a number of bridges, or ferries, rendering a passage from the eastern to the western continent possible, even to men of primitive culture."

Prof. Holmes led me to a large globe which stood by his desk, and with his finger traced these possible paths.

Bridge From Europe to America.

"Evidence has been offered that the northern portions of America, here, were once 2,000 to 3,000 feet above their present level. This supposed uplift of the northern part of our continent, and of the North Atlantic basin

is thought to have occurred some time during the Glacial Epoch. It must have established a continuous land connection between the arctic regions of the eastern and western continent. There is evidence that lower animals and plant life crossed this or some other bridge, for the same species of land snails occur, both in Labrador and Europe, while distinctly European species of plants are found in Greenland. At the same time

while distinctly European species of plants are found in Greenland. At the same time a number of species of American mollusks are found along the Scandinavian, and even the English coasts. This land bridge is thought to have connected Europe and North America by way of Iceland and Greenland, and thus separating the Arctic and Atlantic oceans. The evidence is that it remained above water at the close of the Glacial Epoch, and it is held by some that by this time man had taken up his abode on our continent. Some hold, however, that the ancestors of the Indians came over by ice bridges and ferries after this land bridge had subsided, and that such a route may have been from Africa or the Canary islands to South America. You will note here on the globe that the distance from Africa to South America is less than the length of the Mediterranean. Prof. Daniel G. Brinton, a great authority, believed that man first reached our continent by one of these routes from the western coast of the Old World."

Another Bridge, From Asia.

"Do you believe also that the Indians entered our continent on the eastern side?"

"I see no need of considering these routes when we have even now between America and Asia a ferry route across which one continent is visible from the other. This is Bering strait, which in modern geologic times was probably bridged over by ice, across which man may have traveled. I do not deny that men may have drifted across by the easterly routes from time to time, but I hardly believe that they made a successful lodgment here by such scanty means. The Bering sea route only permitted a free flow of humanity from one continent to the other. Moreover, the American aborigines resemble the Asiatics more closely than races of other points of possible contact. By the time these ancestors of the Indians had migrated from the central coast of Asia to Alaska, even if well advanced toward civilization, they were reduced to the state of mere hunters and fishers, and were not practicing arts beyond those required as means of subsistence. The rigors of the long journey made in gradual steps by generations after generations pressing gradually northward had stripped them of all knowledge of agriculture, of all cattle, all knowledge of the metallurgic and other higher forms of handicraft. Hence America did not inherit the culture of the old world. Arriving on this continent, the new environment must have changed even their religion, social customs and form of government. Those remaining in the arctic regions retained a hunting-fishing culture; those who went to the desert became brush people and lived upon snakes, rabbits and cactus fruit; those pausing where nature had built their houses and done their quarrying for them became cave men and cliff dwellers; those whose lot fell in the great fertile valleys practiced agriculture. And so on. Each group developed a new culture not only American, but largely local."

Came Ten Thousand Years Ago.

"When did these ancestors of the Indian first arrive on this continent?"

"It is estimated by some geologists that the ice of the glacial epoch receded from the northern edge of the United States from eight to ten thousand years ago. In some places have been found human remains which seem to date back to the end of that period,

PROF.
W.H. HOLMES

thus apparently establishing the date of man's first coming at 8,000 years ago at least. Some believe that they have found here traces of man going back into and even beyond the glacial period, but the evidence is so meager that it seems hardly wise to accept it. Some extraordinary discoveries of human remains in California are offered as evidence that man occupied this continent before glacial times. Among these are polished stone implements dug from gravels which geologists agree are so old that if these implements were really buried there it was by men who must have passed through the savage and well into the barbarous stage while 'Pithecanthropus erectus,' the hypothetical earliest representation of the human race in the old world, was still running wild in the forests of Java, a half-regenerate ape. Furthermore, acceptance of this California testimony would place the presence of man in America far back into a period to be reckoned not in tens, but in hundreds of thousands of years. I should say that we as yet have no satisfactory proof that man existed on this continent until about the close of the glacial period, which might be eight to ten thousand years ago, but the figures must not to be taken too seriously."

"Happy Hunting Ground."

"I imagine that the researches of ethnologists and archeologists are disposing of many fallacies regarding the Indian—many which formerly had a firm place in popular belief."

"Yes. Take, for example, the theories as to the mound builders and cliff dwellers, that they were racially distinct from the Indians or that they had reached a superior degree of culture. The fact is that the more thoroughly we explore the mounds and cliff ruins the more apparent it is that the attainments of their builders were as a whole not markedly superior to those of the later Indian."

"The Indian's belief in the 'happy hunting ground' and in one overruling deity, the Great Spirit, are other popular fallacies in point. No tribe was without some idea of life after death, but as to its exact nature and whereabouts the Indians' ideas, differing in different tribes, were vague. They do not seem to have evolved the idea of hell or future punishment. And very far removed from a conception of one all-powerful deity, the Great Spirit, is their belief in a multitude of spirits that dwell in animate and inanimate objects. These spirits were the source of good fortune, whether on the hunting path or war trail, in the pursuit of a wife or in a ball game. If successful, he adored the particular spirit appealed to, offered sacrifices and made valuable presents to it. If unsuccessful, he cast his manitou away and offered his faith to more powerful or more friendly deities. In this world of spirits the Indian dwelt in perpetual fear. He feared to offend the spirits of the mountains, of the dark wood, of the lake, of the prairie. So you see the real Indian was a different creature from the joyous and untrammelled savage pictured and envied by the poet and philosopher."

The Indian Medicine Quacks.

"Quacks with herbs and methods of practice which they claim to have received from noted Indian doctors are largely responsible for many fallacies concerning the red man's practice of medicine. As a matter of fact, the medical art among all Indians was rooted in sorcery, and the prevailing idea that diseases were caused by evil spirits and could be removed only by

sorcery and incantation controlled diagnosis and treatment. The color, shape and markings of plants indicated the human organs which they were supposed to cure.

"Another misconception concerns the Indian woman, and through it she is pictured as a drudge and slave, toiling incessantly while her indolent husband idles away the time and exists chiefly by the fruits of her labor. Although in Indian society the position of woman has always been subordinate, the division of labor among the sexes was not so unequal as it might seem to the casual observer, and it is difficult to understand how the line could have been more fairly drawn in a state of society where the military spirit was so dominant. There is also an adage that the 'half-breed' is a moral degenerate, exhibiting few or none of the virtues of either, but all the vices of both parent stocks. As a matter of fact, there are in many parts of the country many mixed bloods of undoubted ability and high moral standing. Where their morals are low environment rather than mixture of blood appears to be at fault. The 'half-breed' outstrips his Indian brother in the pursuit of either good or evil.

No Pigmies, Giants or Princesses.

"That there were giant and pigmy races among the Indians is another popular fallacy. The giant myth, perennial in the newspapers, is revived at times by the finding of bones of the gigantic animals of past geologic epochs, which the ignorant suppose to be human remains. Now and then, as among other races, are found skeletons of Indians who were real giants. One exhumed in West Virginia measured seven and one-half feet in length and nineteen inches across the shoulders. The popular myth that an ancient race of pigmies once dwelt in Tennessee owes its origin to the discovery in that state of numerous small coffins containing human bones; but scientific examination disclosed that the bodies when prepared for burial in these small stone coffins had been stripped of flesh and then disjointed. Mummies of children hastily supposed to be those of dwarfs gave rise to the myth that pigmies dwelt in the cliff ruins of New Mexico and Arizona. The discovery in the cliff dwellings of the southwest of small apartments with small doors added weight to this myth, but research has proven that these spaces were cubby holes used by men of normal stature for the storage of property.

"Pocahontas is called an 'Indian princess' in much of the literature concerning her

now being revived apropos of the Jamestown exposition. This idea that there was royalty among the Indians is also fallacious. As a matter of fact the government of each Indian tribe, at least in northern America, was a simple democracy, whose cardinal principles were equality and independence. The offices were purely elective, the ability, courage, eloquence, previous service and, above all, the personal popularity of the candidates forming the basis for their election to any and all offices. No power in any wise analagous to that of the despot, no rank savoring of inheritance, as we understand the term, existed among our Indians. Even military service was not compulsory. Other common fallacies are that the Indian disposition is universally stolid and taciturn and that the tribes were nomadic. The Indian of today has a fair sense of humor and is by no means a stranger to jest, laughter and even repartee. And as to the nomadic myth, the fact is that every tribe laid claim to and dwelt within the limits of a certain tract or region, the boundaries of which were well understood."

The Indian's Future.

"What, professor, will be the Indian's future?"

"In the great crucible of our civilization so many elements are now being mixed together a racial strain so numerically weak as the Indian will not only amalgamate with the other race, but disappear. It is insufficient to seriously affect the resultant race. When the white man first visited this continent there were probably 10,000,000 or more Indians here, and today there may be half that number of approximately pure bloods—one three-hundredth of the world's population. In the inevitable course of human history the individual races will probably fade out and disappear, and the world will be filled to overflowing with a generalized race in which the dominating blood will be that of the race that today has the strongest claim, physically and intellectually, to take possession of all the resources of the land and sea. The resultant race will not have of the native American blood even this one three-hundredth part, because they are decadent as a result of conditions imposed by civilization. As diagrammed by the ethnologist of the far future, the career of the Indian will appear as a lenticular figure—beginning in nothing, ending in nothing—a figure of perhaps universal application by the historian of mundane things."

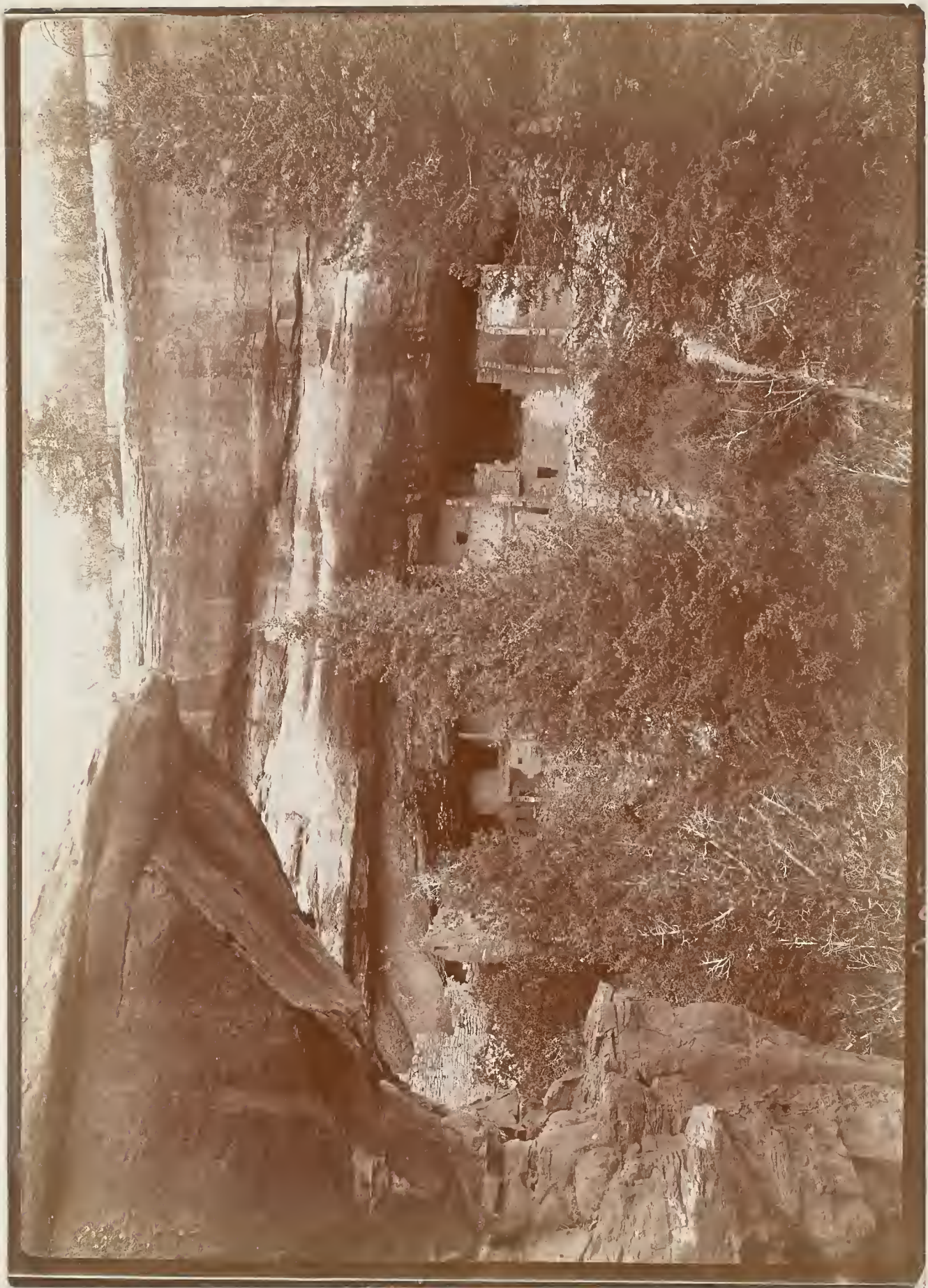
JOHN ELFRETH WATKINS.



Mesa Verde park
Square Tower in foreground

Mesa Verde





Rocky View



Castell de Muro

VOLUME IV, PART II

SECTION II MISCELLANY

July 10, 38 362-B.

Card from with subject on Sept 1928

600. CLIFF PALACE, MESA VERDE NATIONAL PARK, COLO.

was with him here 1874. Correll.



92533



in the Camp and Graves, with many

1876
Hayden Survey of the Territories
Most of my sketches were made in special boxes
1876
JOURNAL OF TRIP TO THE ROCKY MOUNTAINS
Beginning August 6, 1876.
By W. H. Holmes.
with A. D. Wilson
For Dr Geo P. Merrill
Copied from field note
book, which ends Sept 16 1920
W. H. Holmes
V
Left Washington at 6 Aug. 6th, in company with Mr. Bech-
ler and Mr. Atkinson. Fare to Omaha, \$27.50; berth to Pitts-
burgh, \$2.00. Beautiful day in the glories of midsummer. The
recent rains have freshened everything. The season has been
unusually dry up to within a week. Observed that charming river,
the Susquehanna, and noticed especially the curious structure
of the mountains to the west. Pittsburgh at six. Dinner at
Altoona, \$1.00; lunch at Pittsburgh, .30; berth to Chicago, \$2.50.
Aug. 7th: Breakfast at Chicago, .75; berth to Omaha, \$3.00;
crossed the "Father of Waters" at Burlington at 7 o'clock, water
low, 9th crossing for me; supper, Burlington, .75.
Aug. 8th: Breakfast on the train, .75. Western Iowa is
a most delightful country to look at. Threshing is going on.
The farms are very thrifty looking. The Missouri is muddy as
usual and Omaha is not apparently a thriving city. After three
hours hard work we are transferred and checked, etc. and started
for Cheyenne. Met Mr. S. L. Barrett, the lame one, and old
school mate at Hopedale. He has hardly changed, is teaching
the town schools in Columbus, Neb., and is married and has a
family. Atkinson stops over at Omaha with his cousin, Lieut.
Lockwood. Fare to Cheyenne, \$15.50; sleeper, \$4.00; dinner,
Fremont, \$1.00; supper, Grand Island, \$1.00; breakfast, Sidney,
\$1.00. Nebraska is rich and beautiful for many miles, even
until night set in above Grand Island. In the morning nothing

could be seen but barren plains, with low lines of bluffs. Telegraph poles, prairie dogs, antelope and a few R. R. stations, desolate ranches and cattle. At Sydney the bluffs come close up to the town. There is a military post south of the station. This is said to be one point of departure for the Black Hills.

Aug. 9th: Arrived at Cheyenne at noon. Time from Washington 3 days 7 hours - the shortest time yet. Found Wilson and Steve Hovey waiting for us and expecting Stevenson and others. Camp is at Davis' Ranch, 12 miles out. Everything appears to be in order for starting. Remained one day at the R. R. House. Had a couple of games of ten pins with Steve in the evening.

Aug. 10th: The eastern train brought in Garnett, Coues, Atkinson, Reading and Cuthbert. Reached camp before 6 o'clock. The ranch is a rude group of low log and adobe houses, with the usual stables and corrals attached. It is east of the R.R. to Denver and is situated in a grass covered but treeless flat, which is surrounded by low smooth mesas and buttes. Camp is just back of the house. A good spring near by supplies water.

Aug. 11th: Went fossil hunting with Davis and Harry. Ten miles to the east we procured a number of bones; had a hot ugly ride.

* Harry Gault - our hunter

Aug. 12th: Went Antelope hunting with Harry*. Rode 6 or 7 miles over the smooth mesas before sighting game. From a point of the mesa we overlooked a broad smooth valley. On a hill in this valley and fully a mile away we could discern a small herd (11 or 12) of antelope. In order to reach them unobserved we made a circuit to the south and after 3 or 4 miles ride were approaching them from the east under cover of a low

ridge. As we rode along a fine buck sprang up and disappeared behind a low spur of the hill. Harry sprang from his horse and ran to the top of the spur and in less than 30 seconds had sent a bullet through antelope's heart. After dressing him we approached the herd above. Getting within 200 yards we fired at a couple of fine bucks that stood in front without effect. The whole band ran in a circle about us and then struck up the valley. Three more shots each were fired at the running band but without even wounding one. Afterward we chased another band but did not succeed in killing anything. We were now almost famished and started for a spring which Harry had seen in the neighborhood. After a short rest we rode to camp. Stevenson and Mrs. Stevenson, Pearson, Bechler, Chittenden and others arrived in the evening. Dr. Hayden is in Cheyenne, also Dr. Endlich. At night a fearful wind storm swept through camp; at 9 in the morning it was still blowing.

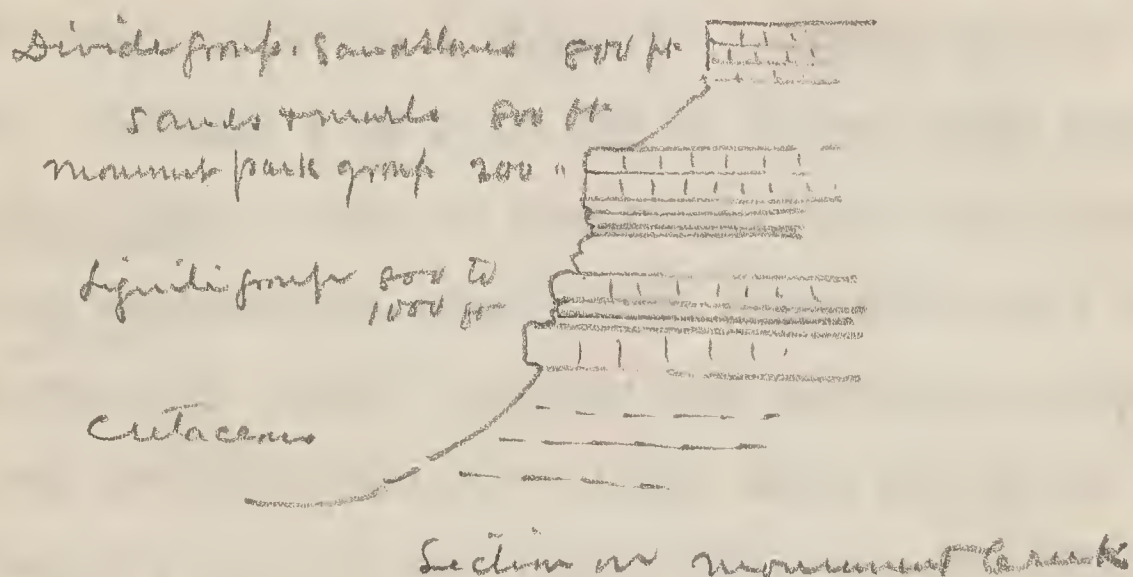
Aug. 13th: Nearly all of the Divisions moved out, Wilson's and Gannett's toward Denver, Chittenden by rail to Rawlins. Bechler goes to Rawlins tomorrow and Coues will go soon to Middle Park.

Aug. 14th: Off for Denver at five o'clock. Breakfast with Gannett at Greeley. Found the pack trains there, they having made a 40 mile march. Put up at Charpostsⁱ, Denver, and went to work making purchases of articles for the trip.

Aug. 15th: In the afternoon the party came in and were soon aboard a freight car bound for El Moro.

Aug. 16th: Took the two o'clock train for El Moro. Bade goodbye to Gannett, Peale and Stevenson at Pueblo. Arrived at

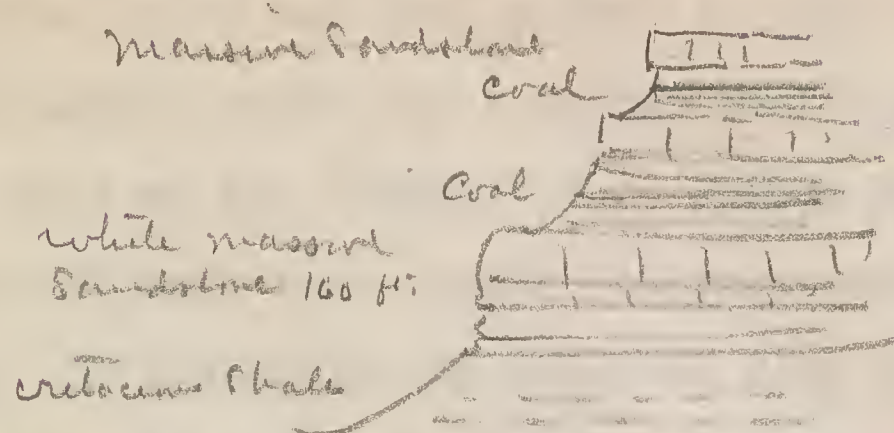
El Moro at 2 in the morning. Our party consists of Dr. Hayden, Mr. Wilson, Mr. Atkinson, Mr. Reading and myself. Dr. H. Peale and I set to work to study the geologic section from the Divide to Colorado Springs, and they seem to be convinced that I was right in esteeming the Monument Creek group as separate from the Divide group and that the interval between is filled with sands and marls - red, white and yellow - some 700 feet in thickness.



Watched the sunset behind the Pikes Peak group and found camp in a corral, El Moro at 2 o'clock August 18th.

Aug. 18th: El Moro. Thursday the outfit was packed and sent forward to the base of Fishers Peak. Dr. Hayden and I rode westward to the bluffs, three miles from El Moro. The strata crossed in the gradual slope were about 800 feet of cretaceous shales, containing toward the top specimens of *inoceramus baculites*, etc. in concretions. About 200 feet followed these composed of alternate layers of sandstone and shales. The first escarpment of the bluffs is of a massive white sandstone, somewhat irregular, bedded 150 to 180 feet thick. Above this are about 200 feet of shales and coal bearing strata, then 40 or 50 feet of sandstone, yellowish and firm. A higher ridge beyond

shows some 300 feet more of strata - sandstone and shaly beds capped with a massive sandstone.



Passed through Trinidad - which is a lively little town - mostly American. Reached camp half way up Fisher Peak before night.

Aug. 19th: Made an early start for the summit of Fishers Peak. The castle-like summit hung high above us, the basaltic cliffs appearing almost vertical and certainly difficult to scale. We kept up the left face of a ridge that led up to the peak and approached the base of the turret-like summit from the northeast. Found a high hitching place for our mules in a little amphitheater within 200 feet of the top. On climbing up we soon found ourselves on the crest of a ridge that connects the peak with the tableland to the east. This narrow sinuous isthmus appears in one of my sketches - see large book. The basalt is from 500 to 700 feet thick and for the last 150 to 200 forms a vertical semicolumnar wall. The summit has a nearly flat table of several acres in extent covered with grass and flowers. The view from the summit is of considerable interest. Pikes Peak appears in the north. The Greenhorn mountains and the Spanish peaks follow to the west and the Calabra group and range continue to the south. The great broken lignitic table land lies under us to the west, circling from near its Spanish peaks at the north far

out around the Raton hills to the east and touching the range, apparently, far to the south. The streams, and especially the Purgatoire, have cut deep gashes in this table land, exposing the cretaceous shale for a little distance up the valleys. The higher part of the "Hills," i.e. Fisher Peak and the table land to the east have been capped and preserved by a heavy bed of basalt. In descending we gathered fine raspberries and choke cherries. Harry Yount had been out hunting all day but returned during a heavy rain storm without game. As we sat in an old house, by which we had camped, Harry looked out one of the windows and suddenly said, "Mr. Holmes, get your glasses and let's look for deer over against ^{them} these hills." At the same time he looked across the valley which intervened and saw four deer, two does and two fawns, playing about on the slope some $\frac{1}{2}$ of a mile away. In an instant he was off with his gun and with our glasses we watched him approach the game through the bushes and trees. Presently they ran and stopped and returned to look, then ran again and a shot from Harry's rifle sent them flying, but one only leaped wildly for a while and plunged into the bushes dead. The others were allowed to escape.

Aug. 20th: Sunday. At Trinidad. A twenty-five mile march first down the hills through Trinidad and then up the Purgatory river toward the mountains completed this day's work. Trinidad was alive. The country people came in to do their purchasing, etc., on Sunday. The stores and saloons are all open. Up the river the settlements are all Mexican and the people and their surroundings are most unique and interesting. One feels almost as if suddenly transported to some foreign

land so different are the people and the arts and occupations, habits and habitations, their small stature and dark color being scarcely fairer than Indians. Their rough dress and homely women, their small illy furnished, flat-roofed adobe houses, their herds of goats and white backed sheep, and above all their harvesting with sickles and threshing on the bare ground by driving sheep and goats over the grain, greatly impressed us. One of the most picturesque sights I have ever seen was a view from a promontory overlooking the valley of the Purgatory. In the distance was Fishers Peak quite blue and indistinct, while nearer between the green hills lay the beautiful valley, yellow with the rich harvest. In the foreground was a most interesting group of a dozen or more Mexicans - men, women and children - busily engaged cleaning wheat. The circular space had been cleared, the grain laid down and tramped out by goats and the straw raked to one side, and now they were separating the grain from the chaff. Two men held a large sieve between them, while the women and girls carried the uncleaned grain in pans or baskets to feed this primitive mill. A fair breeze was blowing and a gentle movement of the sieve by the aid of the wind separated the chaff from the grain, which fell to the ground in a great heap that looked like so much gold. The landscape, the houses, the varied costumes of the people and the oddity of their occupation, fairly enchanted us. Camped by the river, which is quite muddy, and had visits from a number of the inhabitants, a greater portion of whom are dogs. Men, women and children look like starvelings and are totally without education. We were much amused by the herds of goats that came down

driven by the herd boys to the river crossing on their way to the corrals for the night. The lambs or kids were considerably frightened at the roaring though shallow water and their antics afforded us much fun.

Aug. 21st: Marched 25 miles farther up and camped on the banks of the stream (which is here a fine mountain creek) and by the border beautiful meadows surrounded by pine covered hills. The rocks are nearly all of the lignitic formation. Coal seams could be seen cropping out nearly everywhere. This beautiful little valley has been washed out of the cretaceous shales, which were here exposed by a lateral fraction or outpush from the range. The lignitic forms the upper parts of the surrounding walls.

Aug. 22nd: A cool, windy morning. Followed the Purgatory up to the base of the hog backs of the lower cretaceous and found the road turning to the south up the depression eroded from the middle cretaceous shales. There is here a good deal of pine timber and the grass and vegetation are very fresh and green. Large herds of sheep are kept on this range by Mexican paisanos. From Purgatory Creek we crossed a low divide into the head of the Vermajo, a tributary of the Canadian. From the head of this valley we turned to the westward and crossed into the Costilla valley, leaving Costilla peak on the south and the Celabra group on the north. In the meadows are a few Mexican ranches. The people are the lowest I have seen. They are hardly better than Indians. Some of the young women smear their faces with a heavy coat of dull red paint. They are most uncouth and

obnoxious creatures. The wheat, which has been sowed in small patches, is quite green and the corn stands no chance to ripen and beside the grasshoppers are taking it by storm. Camped after 20 or 25 miles in a little park on the Costilla.

August 23rd: Broke camp and set out at an early hour for Culab~~y~~ra Creek, a heavy white frost covered the ground and small pools of water were covered with ice. The trail across the divide is very bad; for ten miles of the way it was a scramble over logs and rocks and up and down very steep places. Twenty-five miles - a long day's march - being completed, we camped on Culabra Creek near the base of the peak. The Costilla and Culabra creeks are branches of the Del Norte and in their lower course flow through the San Luis park.

Aug. 24th: Culabra Peak. Rose at daylight, ate breakfast, saddled up and were off by sunrise. Followed a long spur that led up to the main western spur of the peak. Hitched within 1000 feet of the top. Made a complete panorama, which filled 12 pages. The Raton Hills lay beneath us to the east and the Spanish peaks made a very fine portion of the landscape. Castilla Peak appeared in the south and Sierra Blanca and the Cretones in the north. The view to the west is particularly interesting. The San Luis park with its buttes and wooded hills, its lakes and river, courses and its blue distances, presents a grand aspect indeed. Descended to camp in good time. The rocks in the neighborhood of the mountain are metamorphic.

Aug. 25th: Marched 20 miles to Fort Garland - a military post near the base of Sierra Blanca. For a few miles we were in the foot hills, but emerging from these we came out upon the

flat plain of the park. We reached Garland before noon and found but little mail. There were a number of pleasant gentlemen, officers of the post, there - especially in the neighborhood of the settlers store where whiskey ran like water and most of the officers were soaked. Major Jewett is in command and seems a very nice gentleman. Camped at the south foot of Sierra Blanca.

Aug. 26th: Rainy morning, not possible to make the climb today. The camp is under a clump of aspens by a small brook. It is a pleasant place. Attempted a sketch of a portion of camp, but had indifferent success. The outlook upon the park is most wonderful. The effects of light, shadow and color that pass over the velvety plain on such a day - sunlight and shower. A couple of sketches very faintly and imperfectly represent its charms. I know of no place that affords a richer field for the painter than these mountains along the east side of San Luis Park. The sunsets are always fine.

Aug. 27th: Rode out with Dr. Hayden to make some geologic examinations. Found the outcrops about the east base to be a modern conglomerate tipped up at an angle of 60° and striking S. of S.W. Passed over the drift covered terraces and ridges. Much of the drift seems to come from the disintegration of the recent conglomerate. Hunted for a while without success and returned to camp without game. Passed a herd of Mexican sheep; there must have been 3000 head; about one-third were black. A boy and dog tended them. Harry shot a small, perfectly white rabbit. The clouds hung low along the ribbed slopes of Blanca as they had done yesterday.

Aug. 28th: Morning promised a clear day and we set out for the summit of Blanca. Dr. Hayden, Wilson, Atkinson, Redden and myself rode up a narrow and steep ridge to timber line. Some two hours work. Hitched our mules to the highest bushes or to the rocks and began the dreaded and terrible climb, 2600 feet vertical and about 3 miles horizontal, with much up and down. First up about 1000 feet to the first shoulder of the main southern spur, then down slightly along a saddle and up 500 feet to the second and main shoulder, all this distance over the steepest possible grades of rough broken, recompactd and loose rock. But this much was only the introduction, the prelude to a great act. The two miles of serrated sharp and ragged comb that connect this high southern shoulder with the main pyramidal summit, which now appeared to the north, seemed a pathway impossible to mortals. We pushed steadily forward, crawling and skipping and poising, climbing up and now letting ourselves down until we found ourselves at the base of the last sharp ascent. Mr. Wilson and I reached the summit at 10 o'clock 30 minutes, the others shortly following. It seems a day's work to describe the scene - nay a month. Let me jot down a few helps to the memory. The sharp, jagged spurs that lead out in four directions to the first great shoulders; the mighty amphitheater heads of valleys; the awful chasms and dizzy precipices; the crestones dark beneath the clouds to the north; the tree dotted slopes and the ribbed and scarred summits and the two low passes, Mosca and Music. The inimitable park to the west and far beneath us a mysterious unreal land, hazy and blue in the distance, hemmed in by bluer mountains and dotted with fanciful patterns of lakes and cloud

shadows and highly colored, velvety grass (or vegetation). The fleeting fleecy clouds tipping the peaks and hanging like airy animated creatures over the lowlands - altogether a scene unparalleled, sublime as an ocean and to the eye as limitless. To the north and east were Pikes Peak 100 miles away, and the Greenhorn Mts. and Wet Mt. valley and Huerfano park. The plains and the Bauldy group and the Sanghu^M de Christo and Aveta passes, the Culabra, Castilla and groups of mountains to the south Rite Mt. Sandenlonia Mt., the summit district and the valley of the Rio Grande, with a line of light to the south and west. The descent was apparently more wearisome than the ascent. We reached camp at dark as weary ~~xx~~ a set of mortals as could have been met in many miles.

Aug. 29th: Marched to the Rio Grande. The Sierra Blanca is all schistose near camp and extending for a mile southwest is a dyke quite narrow, a row of small hills to the left and we passed from camp out to the borders of the plains is trachytic(?). Trees, pinons, yel. pines sparse, aspens, cottonwoods, willow, wild cherry, sage, greasewood and other shrubs. The streams, i.e. the small ones, soon sink in the plain. Passed a few adobe houses and fenced meadows, then all is level and barren. March near 30 miles. Struck road within ten miles of river. Camped at ranch near river.

Aug. 30th: Marched up river to Del Norte. Lunched at the Modoc Ranch. Mr. Venable informs us that there has been a more than ordinary amount of travel - mostly to the San Juan mines. Season has been dry. Hay is \$15 per ton. Del Norte is looking up. Times are much better than last year. Camped by

the bridge that crosses to Luna among the Cottonwood trees.

Aug. 31st: Got ready at an early hour for a side trip to Blaine Peak in the Summit district 40 miles southwest of Del Norte. Wilson, Atkinson and I set out with a couple of pack mules. Followed the wagon road to the Summit mines, 30 miles, and passed on through the swampy highland and camped at sundown within 6 or 7 miles of the peak.

Sept. 1st: Blaine peak (?) Summit District. Rode over to the peak and hitched within less than 1000 feet of the summit. Most of the way was over swampy land and boggy slopes. The peak is not extraordinary, is trachytic and steep on the north side. Got my first good view of the San Juan Mountains, which with the great Quartzitic group beyond with its thousand sharks teeth summits, made one of the sublimest of mountain panoramas. The grand mass of summits with their bare scarred sides and the dusky tinted slopes descending into the blue depths of the canons and valleys; the ragged crags of the foreground and the extremely long and steep slides and timbered slopes of the valley head beneath us. The speckled checkered mixture of colors near the timber lines and the undefined shapes and distances and a peculiarly interesting showery sky, all should be seen and wondered at and portrayed by the painter. To the west and the valleys of the north branches of the San Juan, the Laplata mountains could be seen; beyond this the Mesa Verde and the tips of the summits of Sate. To the south the low country of the San Juan basin and beyond this the Carrus and Tunccha mountains. I made a somewhat detailed sketch of the trachytic group to the south. The western and southern border of the Summit district; Banded Mt. is the

highest point. The main central portion of the Summit district is a peculiar and remarkable region. The drainage is very imperfect and as a consequence the central valleys are great bogs - very high and cold and uninviting although from a distance they seem a land of meadows, as the whole surface is covered with rich grass and shrubbery and the dryer slopes are fragrant with spring flowers. Pine forests occupy a large part of the higher slopes. The mining region appears to be near the center of the district and a group of high volcanic buttes seem to contain most of the ore - gold and silver. Already seven or eight stamp mills are at work and the general look is one of prosperity. Some of the slides are rich in color; the country is beautiful to look upon. The drainage is in the Del Norte on the north and east and to the San Juan in the south and west. Blaine peak is on the divide. The rocks are all trachytic. Returned to camp in good time. Repacked and made a march of some five or six miles, recamping again within a few miles of Summit and near the head waters of a branch of the South Fork of the Rio Grande.

Sept. 2nd: Descended the branch of South Fork; passed down a narrow high walled valley. There were sweet pine forests and grassy parks. Shortly we struck an old Indian trail which followed the valley for a few miles and then at an elbow in the stream the trail turned over to the east and followed down another south branch of the South Fork. Passed through many beautiful parks and saw much game sign. Reached the South Fork at about 5 o'clock and were in camp 3 miles above the junction with the main stream, in good time.

Sept. 3rd: Marched 25 miles up the Rio Grande; camped at a ranch several miles above wagon wheel gap. In the open valley above the gap a patch of modern formation appears; did not examine it. A ridge of limestone outcrops along the river and near the bridge a massive bed is seen to lap up against the valley wall. Found small outcrops of porous, impure limestone at all points up to camp (see map). The drift in the valley is quite extensive.

Sept. 4th: Passed through Antelope park and the canon to the bend, then turned up the trail to the south and crossed over the Rocky Mountain divide to the head waters of the Rio Pinos and camped under the east base of the Rio Grande pyramid.

Sept. 5th: Rio Grande Pyramid. Rain fell during the night and early in the morning. The clouds broke, however, and we started up the little stream that heads against the peak. At timber line we encountered a heavy snow and rain storm; made a fire and waited for a clearing. Reached the summit at 11 o'clock and sheltered behind a small monument and ate lunch and shivered while a severe snow storm was raging. By one o'clock the clouds broke again and the mountains began to peep out. The famous Quartzitic group lies immediately to the west beyond the high smooth valley of a branch of the Rio Grande. This group seems to be a breeder of storms; the thunder hardly ceases about their summits. One of these summits is very properly named Aeolus. Peak after peak came out and presently such an array of needle and spire like points were in view as I had never seen before and as cannot be found anywhere within the boundaries of the U.S.

My hurried sketch may help to recall the character and details of this fine group. The clouds were constantly hovering about and dragging the summits and throwing deep shadows. A few points were clear but for a moment. The sun was behind and above, perhaps a little to the left, so that there was much deep shadow. The sun struck the gray smooth surfaces and a thousand points glittered like gems. The summits are almost needle sharp and the crests are notched, not like ~~a~~ saw teeth but like a comb and the steep sides of the immense precipices are scarred and seamed with the sinuous lines of the contorted but generally upright crystalline strata. I have never seen, and perhaps never shall see again, such a compact cluster of high, steep, rugged and totally naked mountains. The color is invariably gray and the great proportion of deep, blue gray shadow - prevailing almost totally below - added much doubtless to the unusual degree of profundity in depth, etc. The low ridges in the middle distance are somewhat bare above, but below are quite covered with grass and willows, with a heavy setting of dark pines below timber line. The course of the Rio Pinos could be traced down through the s.e. of this group and the Rio Grande was visible in a number of places throughout its crooked course. The high groups to the north and west of the quartzites were but little in view on account of the clouds. Uncompag~~here~~ne loomed up as usual but much snowed in. The rocks of the pyramid are all trachytic, horizontally bedded. The group is small, this being the only summit of note. The upper valleys here are almost covered by a growth of scrub willows. It grows in a curious kind of cluster that from

above has the appearance of a coat of mail. The pine forests are quite dense. Reached camp at six, two and one-half hours descent. The summit is always dark and is pyramidal in shape from all points of view.

Sept. 6th: Descended to the Rio Grande and marched up it almost to the source. The stream lessened quite rapidly and is always in narrow valleys or canons. The wagon road is very bad; the trail is much used by pack trains of burros employed by Mexicans carrying out bullion from Silverton. Some trains of these poor abused beasts are barbarously used, their backs being fairly raw. They are picturesque, however, when seen picking their way over the steep and dangerous trails. The quartzites begin to appear in the bottom of the valley near the source and on the divide, which is 12,200 feet high. The trail separates the quartzites from the trachytes, the latter being on the right. The view from camp was quite mountainous and picturesque but the effect was bad.

Sept. 7th: Silverton. Crossed the continental divide and entered Cunningham Gulch. A fearful descent by the well worn trail brought us to the stream which is formed by a hundred cascades that leap down the smooth rock faces. Mines have been discovered all over the faces of the walls and zigzag trails lead up to cabins and leads that look impassable to man or beast. The stream has some fine cascades and pitches down toward the Animas at a fearful rate. A large saw mill is in course of construction. Passed a party of southern Indians, who had a train of burros packed with apples. These they were taking north to trade. We bought a quarter's worth, about ten little wilted tasteless things

that had been picked before ripe. The Indian with his red blanket and bare legs and his picturesque pack outfit made a good subject for a picture. Passed through Howardville, which is a small half-inhabited place, and might be named Hardville. Reached Silverton by noon and were met and gazed at by a crowd of lazy bummers. It seemed to be court day. Silverton is a small mining village situated in a high valley surrounded by enormous mountains and reached by the most difficult passes. Saw Harry Lee, who we found was on his way to Ovray to join Stevenson and Gannett, from whom he had received a letter requesting his immediate attendance. Sent a long letter to Hayden. Camped a few miles west of town. Mexican in camp. Arasta Gulch, Burning Charcoal, etc.

Sept. 8th: Marched by trail through the forest and camped near the head of Animas Park. The river had been out of sight all day, as it cut its way down through the quartzite and is in a magnificent but impassable canon. The timber is fine, both pine and aspen. Saw a meadow high up, where three men were cutting and bailing hay to send to Silverton by donkeys - 20 miles. Carboniferous rocks appear beneath the trachyte and north of Engineer mountain and at Cascader Creek form the bluffs. The crystalline rocks appear in the valley.

Sept. 9th: Passed down the valley or park through delightful groves of aspens and pines. The land seems to be all claimed. There are many sheep and cattle - still the grass and flowers are magnificent. Passed through great cherry patches and we choked ourselves nearly to death. Passed the bridge and reached Harnosco early. Saw a German brewer who thinks of setting up in the valley. Had with him a glass of good catawba. Met

some Indians. Passed Hot Springs. Camped where the Laplata trail turns off. The dip of the carb. strata are at first about 5° and afterwards were to 10° . The light colored beds - mostly lime - are upwards of 1200 feet thick, while the red are something more than 1000. Above this is a red and white massive sandstone that represents the Trias. Shortly above this, and perhaps upon it, are the sandstones of No. 1 cut. The valley is very rich, but is as yet but little farmed.

Sept. 10th: Sunday. Parrot City. While the party followed the trail over toward Laplata I rode down the river to the new Animas city. Found one house full of people and the prospect of a road and bridge. Met Dr. _____ of Dubuque, Ia., formerly of Holmes Co., O., who is a nice sort of old fellow; also Mr. Smith, surveyor, and Mr. Marsh. They have secured a charter for a toll road and have located and laid out a town site of some 500 acres. There is good water power and the location seems the best possible. Rode down to R. Dirros ranch about one-half mile below and had a long powwow. He is well fixed and has perhaps the best ranch in the valley. He is working on some coal leads about two miles and one-half below his house. The vein is 22 ft. thick. He is to send me some specimens for analysis, also as much information about the geologic section as possible. There were two or three other men at the house - it was Sunday. I tried hard to satisfy myself about the upper cretaceous formations. I conclude that my San Juan and Laplata coal vein is the same as they are working. The veins are similar in thickness and seem to be in corresponding horizons - perhaps a few hundred feet above the massive sandstones that form the upper escarpment

of the Mesa Verde. The ridge on which Wilsons St. 45 and Chittendens 1 are located seems to be formed of this same sandstone and the Lightner Creek bluff is of the lower escarpment. They are opening some coal seams in this bluff (Moss and Lee). The heavy coal vein above which I had formerly inclined to place in the tertiary looks to me now rather cretaceous, but only by association - there is no positive proof. I observe that the Mesa Verde is denuded of a greater portion of the upper escarpment sandstone than I had thought, and the broad valley of the Laplata and its tributary, Cherry Creek, are chiefly on the back of the lower escarpment sandstone, which for a long distance assumes the horizontal position, the upper escarpment only appearing above the Ute village and outcropping along a line to Wilsons St 45. A large area on the divide between Lightner Creek and the Laplata is terraced with drift. Rode up the divide toward the southeast spur of the Sierra Laplata to a high point formed of the lower escarp sandstone, and obtained a splendid view of the low country about the Rio Laplata and below. There were the mesa and needle and mountain groups just as they were before, but all so clear and delicately distinct that it looked like a new land - fresh and sparkling. What most surprised me was a little city standing on the former unpropitious looking site of the lone house of the Laplata camp - a large village with fresh roofs and weather boarding. If put down blindfolded in or near the place I would have recognized nothing. The trail by which the train had marched led mostly through the depression caused by the erosion of the cret. shales. No. 1 laps high upon the mountain spur and is partially obscured by a capping of trachytic. The red beds

appear in the Laplata canon and on the east face and eastern canons of the Sierras. There is more trachyte than I had suspected. Descended to the valley about two miles below town - Parrot - and soon reached the trail which passes up the bar (wagon road). A couple of cow boys were riding up the road and I was somewhat surprised to meet a light wagon containing women and children and quite ^bdumfounded a large Indian outfit that I had descried afar off dressed in bright colors and covered with trailing gew gaws, turned out to be a party of ladies and gentlemen out on a Sunday evening ride down the valley. I had not heard of this feminine invasion and I was no less pleased than surprised. Found nearly all of the old boys, among whom are certainly a larger proportion of good solid men than can be found in one such mining village out of a dozen. Found our camp in the old place just above town. In the little gulch a dam has been built for the purpose of securing hydraulic power for the placer mines. Giles, Putnam, Lewis, Bennett and others are in town. A county has been organized called Laplata and these gentlemen are the officers. Many good leads have been struck since last year, but the Comstock seems to be the most promising lead. They are down one hundred feet and the ore bearing edges is 12 feet wide. Distributed photographs and books. Harry Lee came in in the evening and appeared in camp with a blanket folded about him. I appeared that he had reached Ouray four days after Garnett and Stevenson had left and had immediately set out for Parrott in order to join us, but being liable to arrest for having given whiskey to Indians and consequently had to keep in the shade at Parrott. He agreed to join us tomorrow. Dick Giles had agreed to get us an Indian, a brother of

Red Jacket, to help us to the successful survey of the Sierra Abajos, but since Harry is with us the Indian is uncalled for. These Utes are apparently very docile and are now engaged at their farms or trading with the Navajos. Red Jacket is raising a little corn on Jim's ranch on the Rio Mancos.

Sept. 11th: Marched to Mancos. Got 30 lbs. potatoes from Mrs. Merritt. The crops are very nice. Turnips, potatoes, corn, wheat, oats, beans, cabbage, rye, peas, barley, fine cucumbers, watermelons, squashes, beets, etc. are doing well. Four or five farmers are at work, but no families have come. A drove of 1150 cattle have just been driven in by Colonel Sheets. The pasture is excellent and high up on the west Mancos is as luxuriant as I have ever seen. Camped in a beautiful park near the source of the West Mancos, within about six miles of the Banded peak No. 1 outcrops in the canon and perhaps a little of the Jurassic. The shales cover most of the surface and extend high up on the west faces of the mountains. No. 1 may show in the head gulches of the East Mancos, but the shales predominate.

Sept. 12th: Climbed LaPlata peak (which I hope to call Harra Guinnip pk) from the west and had one of the most delightfully clear days that I have ever seen. Every object that was within the possibility of vision could be seen. The buttes and tables about Sierra Amarilla, the mountains beyond the Rio Grande, and the monumental valley of Arizona and the Rough mountains in the far west. Made a sketch of the La Plata group and a few of small bits in the quartzitic and elsewhere. Lone Cone and the San Miguels appear in the north and the San Juan mountains make a brilliant show to the northeast. The Animas canon seems to be

tremendous; the walls rise with an unbroken slope to the summits of the quartzites. The carboniferous slopes form high ridges between the streams and are succeeded by the cretaceous lines of hog backs and the level plains and canon divided mesas. The shales between the bands of trachyte in the peak are changed to hard metallic like quartzitic slate with both over and under the trachyte. The heads of the Mancos do not seem to cut deeper than the shales, the whole mountain and the neighboring spurs being made of alterations of shale and trachyte. In the head of Bear Creek, however, the red beds appear capped with a heavy bed of trachyte. The red beds also appear beneath the trachyte in some of the eastern summits. The trachyte extends considerably along the divide and caps a couple of points over toward the Wilson group. I doubt if No. 1 occurs in the area between the forks of Bear River. The point occupied by Chittenden and myself last year on the ridge between Bear and Dolores Rios is jurassic. Beneath is cretaceous and then carboniferous. One of the buttes over toward Wilson is capped with trachyte. There is probably a dyke. A large mass of trachyte on the spur near where our mules were hitched does not belong to the bedded class but extends downward as if it belonged to a subterranean mass. The cliffs are quite high where it is exposed. The heads of the valleys are full of slides of trachyte. The great rounded beds of loose rocks look mobile as wax or dough. The whole of the lower slopes of the mountain consist of a series of irregular steps caused by successive slides or avalanche masses. Trees and brush cover the more gentle and less rocky slopes. It is curious that nearly the whole area between the Mancos and Lost Canon is irregularly terraced by landslides.

The soil is very soft and is covered with aspen groves and willows and the most luxuriant grass possible.

Sept. 15th: Broke camp in the beautiful park and marched down the low country between Mancos and Lost Canon. The pine forests succeeded the aspens and oak brush is quite dense. The cret. shales do not occupy much of the surface below the bend of the Mancos. By three o'clock we reached the trail which runs to the great bend of the Dolores. Came upon Red Jacket's camp a few miles above the mouth of Lost Canon. There was a small village of the ordinary conical tepees, smoked at the top, about which were a number of bucks and squaws and children. Some idling, some horse racing and some engaged in drying great quantities of yucca. It is a funny place for camp, being upon the edge of the sage brush plain some 200 feet above the bed of the stream. Harry and I stopped to have a powwow with Red Jacket. Found him quite sick sitting on the ground, naked below the waist and smeared with white powder or flour. He conversed freely, however, saying that the Abajo country, about which we asked him, was very unsafe, especially to the northwards, but allowed that a "poco tiempo" trip to the eastern base would be "bieno." He inquired about the return of Capt. Moss to the Laplata camp. Said that most of the Utes were in the Navajo country and that Old pog was on the San Juan. Rode on to the great bend of the Dolores and were much pleased to find that the report that there were four or five hundred Indians camped there was totally incorrect. Two exorbitantly ugly and comical fellows came into camp in a little while wishing to "watch our horses" to find out who we were and when we were going and perhaps above all to get something to eat.

They informed us that a son of Old Howde do Bueno had been shot by a Piute and that the whole Piute tribe were g - d - s of be. The expression of one of the fellows when pleading with Harry for a favor was remarkable beyond anything I have ever seen. I fear that I can never describe or paint it. The longing, expectant coaxing twinkle of the eye as he peered intently in to Harry's eyes at a distance of a few inches, the double row of perfect teeth exposed at least four inches horizontally, even more expressive than the eyes, made it with the dark skin and the red paint a visage never to be forgotten. Redden and I walked back to the bluffs to look for ruins. All the bluffs and hills about seem to have been building sites. One hill had a very large mass of almost formless ruin. Pottery and flint chips were scattered about. Night came on before we could see much. The Dolores is quite low. No. 1 outcrops all along and a little of the variegated marl appears where the Rio runs close. The grass is very fine and the wide bottoms would doubtless make elegant farms.

Sept. 14th: Ho for the Abajo. It was decided that the whole outfit should not be taken over to the Abajo mountains, so a side trip was organized. Wilson, myself and the two Harrys were to make a hurried trip into the dangerous country; while Atkinson, Redden, Stewart and the cook were to move camp over to Lone Cone. Seven days were stated to be the probable number required to complete the work west of Dolores and if good luck should be with us six might see our return. Taking a good supply of grub and ammunition, the former to eat, the latter to load down our mules, for the probabilities were that the Indians would not show themselves at all. Seventy-five miles in two days, it

looked big but we made it. Following the trail westward we came in about 12 miles to Sonorera where there was a small camp of Utes, a spring and rather extensive ruins. These are mentioned by Newberry; I had no time to examine them. Between this and the Dolores the gulches cut down to No. 1 but the greater area is covered by the shales. Ute Peak is on the left in plain sight and the Abajos are blue in the distance. The country is covered by sage and pinons, about half and half. The soil is loose, yellowish and pretty deep. Eight or ten miles beyond Sonorera we came to a spring, Ojo Verde(?). It is by a large rock in a gulch and is full of coarse moss. The drainage is probably into the Havenweep. Traveling still to the westward we came into a valley which descended to the north. Here we found a small spring to which we gave the name "Yellow Jacket" on account of the great number of these insects flying about it. Following down about a mile we found the valley enter a canon and turn to the south. It is therefore probably a branch of the Montezuma. Leaving the canon at the bend we crossed into another gulch which soon led us into a pretty open valley of some 100 acres. A number of small gulches or canons opened into this meadow spot and a narrow canon some 200 feet deep led out to the southeast. Near the north side we found a good spring which was charged pretty freely with salts - the taste was much like epsom salts. Made camp near this spring, which we thought to call valla, cilo spring.

map showing vicinity of Vallacito Spring - ruins.

In the valley were some slight ruins and pottery was scattered about. The variegated marls outcropped beneath the sandstone in a few places.

In and beneath this marl, however, are some beds of heavy sandstone. The main sandstone capping the bluffs is from 20 to 40 feet thick. Following the dim trail we soon came to another.

Sept. 15th: Spring under the bluff to the left. Here there is quite a strong flow of water. Ascending to the plain the trail led us by a curious echelon movement indefinitely in the direction both of the Sierra Abajo and the Sierra LaSal. So sidelong were the approaches to the Abajo that we dubbed the trail the "Hug war" trail. The plain is here densely covered with sage. There are a few pinons and a fair supply of grass and flowers. Finding that we were getting too far north, we left the trail and turned down a little flat that led off toward the Abajo. We had gone but a few rods when we struck a small trail that led us pretty directly toward the range. The mountains begin now to show more distinctly and we can see that there are large clusters of timber about the base and on the protected sides of the ridges. Presently we struck a little canon in which were pools of water. No. 1 is still the prevailing rock, although on higher knolls there are patches of shale. Kept steadily on over sage flats and pinon flats until at four o'clock we came to the canon of Montezuma, within five miles of the base of the main mountain slope. The canon walls of No. 1 sandstone are very abrupt and difficult to scab. The little trail we followed led us safely across. There is a little running water. The drainage of the entire eastern faces of the group is into the Montezuma - the small streams or rather gulches, for they are dry-run to the east and strike the canon at right angles. The sandstone of No. 1 are massive, hard, coarse, gritty, greatly cross laminated and

filled with hard seams which intersect. Parts are fine grained and quartzitic. From the canon up there is a gradual slope up most of which is covered with rich vegetation - scrub oak, some of which are large, wild cherry, willows, rose, aspens and scattered about the immediate base fine large yellow pines. Crossed a little used Indian trail half way up the slope and camped near a good spring, beneath some cedars. While some ten miles out we had encountered a very heavy rain and sleet storm which proved to be the first smile of an almost interminable grin, which this uncanny little group of hills unblushingly turned upon us. Before dark the rain commenced and dinner was a damp affair, while the beds were soaked. Breakfast was taken in the fog.

Sept. 16th: ^{mf} Abajo. The mules had been picketted on the creek bank and came up in the morning looking dreary enough. The clouds were breaking and we determined to make the ascent. Clouds still hung about the mountain top and over the plain. The sun struck through in places and we felt assured of success. Before reaching the summit we were enveloped in clouds and were unable to determine which was the summit. We stopped and built a fire and I spent an hour writing on my journal, which I had not carried beyond Parrott city. The two Harrys were sent back to camp with instructions to move close up to the base if it should fail to clear before five o'clock. Wilson and I followed the ridge until we reached the summit proper and unpacked and built a fire. There were so many clouds that but little could be seen. Glimpses could be had, however, as we descended a couple of hours later, of the plains with their canons and the distant mountains. A stratum of loose clouds continued to hang somewhat lower than

the summit during the entire day. Met the boys coming up with camp. Found water near the base of the slope and at dark amidst a heavy rain went into camp.

Sept. 17th: R A I N.

Sept. 18th: R A I N.

Sept. 19th: Last evening it cleared and turned cool and early this morning Wilson and I rode up the slope. About half way we came to the snow and on the summit it was 8 to 10 inches deep. On the former occasion we had been unable to see even the near spurs on account of the clouds, but now all was clear and we looked out from the white summits upon the dark and misty world with a strange feeling of awe. All about us was a plain; in the distance on all sides stood groups and ranges of mountains. Nearest and to the west were the Henry mountains separated from the Abajo by a belt of red and yet gray canon country. Under us to the north was the curious and somewhat dreaded canon Colorado with its flat bottoms and red scalloped cliff borders. In it could be seen the Casa Colorado and the site of attack and demoralization of Prof. Gardner. Beyond this valley rose a red slope terminating in a somewhat serrated hogback, and north still of this were the Sierra LaSal - a handsome, compact, isolated group of mountains. To the left of this and connecting with the valley of Canon Colorado could be traced the labyrinthine course of the canon bound Rio Colorado. The higher series of cliffs seemed to be red, while a secondary were of a yellow gray massive sandstone. Extending from the head of the Canon Colorado eastward to the Dolores there seemed to be a line of cliffs facing the north. The upper escarpment of this line of cliffs would

seem to mark the northern terminus of the lower cret. sandstones, which form the floor of the plains to the south, rising gently to the north and giving a southern system of drainage, which is one of the remarkable features of this region. Cold Springs canon and the head of Canon Colorado seem to cut the deepest into this northern edge of this southerly inclined tableland. From the head of Cold Spring the line of cret. cliffs extend northwest to a promontory which is supplemented by a lone butte and thence connects with the western slopes of the Abajo; as the slope of this table is southward, the drainage from the northern and northeastern slopes of the Abajo is turned to the south and by a semicircular canon enters the Canon de Montezuma. In a similar manner all the drainage to the east up to the very line of northward facing bluff and the brink of Canon Dolores is turned to the south into the Canons of Montezuma and Hovenweep. The Canon of Dolores could be traced as far to the north as the point where the plateau breaks off to the north. Beyond this the plateau region extends to Lone Cone and instead of breaking off to the north slopes off toward the San Miguel in a manner similar to the slope south. Eastward from the Abajo the streams may be seen to enter Canons and can only be followed from this by the lines of cliffs, which increase toward the San Juan until the canons on account of their great number and width occupy more space than the tables or strip of highland between. There seems to be a gentle depression extending across the plains from the Abajo toward bends of the Dolores in which the shales have been preserved in patches and from which the streams enter the shallow canons that cut through the gently elevated belt that runs

from south Abajo to Ute mountain, parallel with the above mentioned depression. South of this there is a gentle dip to the San Juan. Beyond the plains east and southeast appear Lone Cone, Sierras, San Miguel and LaPlata and Latel, south the Cariso and Tunecha, Mesa Verde and Needles, and far off to the west the arched outline of Rough mountain and the mirage like Monumental Valley. Down what appeared to be the line or course of Epsom Creek appears a long straight line of white sandstone outcropping under or west of No. 1 and rising to the west over a series of red and gray sandstones. The western line of No. 1 is south from the middle of the Abajo group along the divide between Epsom Creek and the drainage to the east, which is partly Montezuman and below into Recovery Creek. As to the Abajo group itself, there is but little can be said - its geology and geologic history seem the simplest possible. A mass of trachyte (or perhaps masses of trachyte) has been pushed up through the sedimentary strata, turning up the edges here and there and resting in great masses in or on the cretaceous shales (chiefly). On the east face No. 1 is turned up in a little hog back which dips 45° for a short distance and then slopes off gently to Montezuma Canon 7 or 8 miles away. Inside of No. 1 and almost obscured by the slides or trachyte appears the purple shales of the jurassic somewhat metamorphosed. The outcrops of jurassic seemed to be confined to the main eastern spur, while No. 1 could be traced around to the north, not appearing about south Abajo peak on the north or east but around the south and west and in the first valley heading west of our station and running south (see sketch book). The mountain group is not a solid mass but rather a collection of trachytic hills

separated by saddles in which outcrops of cretaceous shales may be seen. Indeed shales may be seen frequently on the slopes of the mountains. There are at least four of these masses. The trachyte does not outcrop greatly, being moderately hard and homogeneous, but the slopes are steep and slide covered and frequently grassed and on the north faces covered with a growth of pines. Trees of a large size appear near the summit of the highest point. West and southwest winds seem to prevail, as the base shattered and stunted trunks of the higher timber testify. In protected spots are groves of aspens, and low about the base there are dense jungles of cherry oak and willow. On the gentle slopes about the base are groves of scattering yellow pines and considerable areas of pinons; also much good grass. There is no game and but little water - not enough to suggest the idea of irrigation, even settlement should be thought of. Made most of my sketches while in the saddle, as the snow was deep and cold and by noon we were ready to descend. At one o'clock we had reached camp and were packed up and off - homeward bound, not at all sorry to leave an uninteresting place which had caused us so much anxiety and trouble. Our camp was on the cret. shales by a spring. No. 1 dipped beneath the surface at the base of the hog back and appeared in the deeper washes two or three miles below. There will be quite a little area of shales just above the eastern base of the group and west of the Montezuma Canon. Crossed the Indian trail about half way between camp and the Montezuma; No. 1 had passed. The ground was very wet and traveling was heavy. Camped some 20 miles out without water, near the Utah line.

Sept. 20th: Homeward Bound.. Followed our little "hug war" trail directly toward the LaPlata. Came in an hour canoneers spring and five or six miles farther on struck the large trail which we followed for two days out from Dolores. To our surprise a party with wagons and cattle had passed along, going toward Parrott City. Crossed the wagon trail and hurried on toward the Dolores. Came at midday to the brink of a precipitous gulch that led down to the Canon at a point almost on a line between Abajo and Lone Cone. The glimpse of the canon afforded was fine and I was almost startled at the great depth and unexpected steepness. We had expected to cross but such a feat was out of the question. We must follow up the right side of the river until we reached the point at which I had crossed last year. The trail which we had followed did not enter the canon but terminated at a spring near the head of the gulch just mentioned. No. 1, of which there appears perhaps a hundred feet, caps the canon wall and gives sharp cliffs and angles along the upper edges. Under this is a steep slope of some 800 or 900 feet occupied by the jurassic sandstones and marls. This part is much pinon covered. Beneath this slope appears the red vertical walls of the triassic, which extend as far down as I was able to see. The impossibility of seeing to the bottom, together with the steepness and extreme narrowness, made the view very impressive. The depth is probably 14 or 1500 feet. This is probably near the deepest part as the plateau seems to break off to the north and slopes off to the south. We lunched and turned our faces toward Laplata again. Late in the evening we descended into the canon some three miles below our crossing point last year and camped about $\frac{3}{4}$ mile below

our old camp. The walls fall off here to 500 or 600 feet.

Sept. 21st: ^{Canon Dolores.} Followed a hunting trail that led us up to the summit of the cliffs and struck out through the pinons, pines and meadows for Lone Cone. Reached a lone butte at noon and the main trail up Nemmeruchee Creek at 3 o'clock. I got separated from the party along the south face of the upper cretaceous mesa and on finding that there were two trails running toward Lone Cone was afraid to wait for it (the party) and struck out for camp, which I supposed to be in the valley east of Lone Cone. Passed the Beaver Dams and then took the right hand trail at the forks and at sunset was up to the pine timber under Lone Cone five miles beyond our camp of last year. Beyond this I was totally unacquainted with the trail. Dark was upon me before I reached the summit and between the swamps and snow and dense dark timber I had a time getting on, for which no one need ever envy me. Crossing the summit the last red tinge had faded from the west and I plunged into an unknown forest. Sometimes I rode, frequently I led my weary mule. Sometimes I was on the trail, sometimes off, and the boggy, muddy, black and snow drifted forest was a most gloomy place. At last I came in sight of a light and was glad I had persevered. For half a mile or more I followed on and at last rode in triumph into camp - much to the surprise of the sleeping boys who were very glad to see me and somewhat anxious on account of our long stay. I told them the remainder of the party would certainly be in early next morning - took some supper and went to bed with Ht.

Sept. 22nd: Lone Cone. Got a fresh mule and set out to make some examinations at the head of the Dolores. Passed down a

branch of the San Miguel on which was camp and rode eastward from Lone Cone across several small branches and through some of the most beautiful country I have ever seen. The aspens are in their autumn colors and the bushes and grass are especially rich. The streams entered little canon to my left and I could see outcroppings of No. 1. I passed over only shales. Kept on a dim hunting trail that led between the western group of Miguel mountains and a little vol. capped, but that stands to the north; and followed up the branch of the Rio San Miguel that heads between the two groups of Miguel and opposite the head of Dolores. From the timber line saddle I had a most satisfactory view of the surrounding country. Above timber line the mountains are nearly solid trachyte. At timber line or for a thousand feet below the trachyte is interbedded with cretaceous shales and forms occasional bluffs and abrupt spurs. On a map in my large sketch book will suggest most of the outlines. No. 1 seems to cross the Dolores a few miles down and can be traced along a large hog back which extends downward toward the forks. The little group of hills between the two forks of Dolores (the Dolores proper and Bear Rio), on which Chilly and I made a station last year, has exposures of carb., trias and jurassic rocks, but do not extend far to the west and north as the cretaceous beds sweep around from the south to the west and north faces. The end of the large trachytic ridge toward the forks of the Rio appears past the slope of west San Miguel. The Sierra San Miguel proper rise very abruptly to the east of the saddle and are certainly one of the finest groups in Colorado. The Rio San Miguel comes out to the east of this group and can be seen in canon; to the north the red beds appear and the

canon is quite deep. Returned to camp and found all hands in - the first time for nine days. Wilson had camped the night I left him on the west side of Lone Cone and without food had made the peak early this morning and reached camp by four o'clock. All the work in this region was therefore completed and we were ready to set out for the Uncompagne Agency. As supplies were short all hands were glad to be off.

Sept. 23rd: San Miguel River. With some degree of gladness I bid fare well to the southwest and with considerable confidence that I lay my work in this section before the geologic world. Both last year and this this section has possessed a charm peculiar to itself, but after having once been seen and examined has little to hold attention or cause desire for future visit, unless it be the ancient ruins. Broke camp, which had been for 7 days, at the base of Lone Cone and followed the trail to the northeast. Passed around the little mountain which lies just north of west San Miguel and after marching some 13 or 14 miles came to the brink of San Miguel Canon, which is very abrupt and deep. Descended some 1500 feet over No. 1 jurassic and red beds. Found some mining camps in the canon; placer claims are staked out on all bottom land; the area, however, is small. Passed up the Canon about a mile and then climbed out to the east. Found a wagon trail at the top. In looking back up the Canon I noticed that the upper 500 or 600 feet of strata were light colored and that the remainder were dull red with a somewhat brighter band, yellow and red at the junction - a contact. A trachytic butte extends down to the red beds on the right head of the trail as we leave the canon. No. 1 occurs to our right and left as we

reach the top. The country slopes off toward the Uncompaglere river, most of the surface to the right being shales while to the left No. 1 prevails. A few buttes have shales. The great range of the San Miguel as well as the Sneffles group is trachytic with a base of cret. shales. From the east side of San Miguel Canon I had one of the grandest and most enchanting landscapes possible. The subject is worthy of the brush of Church or Moran (see large sketch book). Camped on a small branch of the San Miguel near the Uncompaglere divide.

Sept. 24th: Uncompaglere. Crossed over to South or Dallas fork of Uncompaglere. To our left is a long straight bluff capped with No. 1; variegated marls come beneath. There has been a fault along the line of the creek, as on the east side the shales extend down to the creek bed. The dip is to the west and the fault has been pretty uniform - say ten miles long and having a displacement not above 600 feet. The trail to the agency passes over the cret. bluff (No. 1) to the left, some five miles above the junction of South Fork with the main Rio. The dip is gentle to the agency where the shale occupy the valley. Having stopped to make a sketch of the Sneffles group, Wilson, Atkinson, Redden and Lee went on to the agency and I fell in with the pack train. We followed the creek to the mouth and took the wagon road to the agency. The Rio bluffs are capped with No. 1, but the road passes to the north and is in shale for five miles. An interesting dyke occurs above the agency. Saw small coal seams in No. 1; got a specimen from Mr. Bond. He says the seam is four or five feet thick but not solid or regular. Got also a specimen

from the ridge north of the agency for Dr. Peale. The former will amount to nothing on account of the small quantity and the latter on account of the quality. Got a pleasant letter from Dr. Peale who had left with Gannett for Grand Rio several days before. Their trip to the Dolores had been successful. Met Dr. Mack, who had been with the boys on the western trip. He seems a pleasant gentleman. Read me an account of an Indian dance which he had seen. Major Wheeler replaces Mr. Bond at the agency. Saw a number of Indians. Ouray is in the east. Received papers from Pierson and letters from Scott Paris and Gr. B. The valley widens here and is alkaline and sage covered. A herd of 3000 sheep is here in waiting for the Wemenache mountains.

Sept. 25th: Marched 20 miles down the Rio. There are cottonwoods and willow with other trash. The bottom is white and often as hard as a floor.

Sept. 26th: Followed The Rio some eight miles and struck across the low cretaceous terrace to the Gunnison 7 or 8 miles. The junction is as many miles below. The river is a fine one. Crossed and followed a trail that leads up a remarkable creek to the plateau. The peculiarity of the creek is that it does not follow what seems the natural and appropriate bed or valley near the base of the plateau, but runs down the sloping terrace in a shallow ditch. This the trail follows to camp 12 or 18 miles up.

Sept. 27th: Crossed the plateau which is of the upper cret. and tertiary bed capped with basalt, and camped on a small creek tributary to the Grand and near the south base of the ~~Mam~~ ^{Mam} Mesa.

Mam

Sept. 28th: ^{Mam} ~~Mam~~ The North Mam is some 12 miles away, but we are to make it today while the train marches around to the northeast side. Reach the summit of the plateau near South Mam, having crossed in ascending some 200 feet of soft sandstones and marls. Found the top of the plateau very rough and covered with masses of broken basalt and matted with timber. Reached the summit of the Mam by 3 o'clock and had a good view of the surrounding plateaus, of the valley of the Grand, of the Great Hogback and of the Elk Mountains. The mam-shaped summit is some 200 or 300 feet above the mesa and is of dark, coarse, large celled basalt. I observed that it had been fortified by Indians and found arrow points and flint chips. The defenses were half a

plateau gathers in this narrow valley and passes out through the canon gateway mentioned above.

Sept. 30th: White River Agency.

Mam

Sept. 28th: ~~Mam~~. The North Mam is some 12 miles away, but we are to make it today while the train marches around to the northeast side. Reach the summit of the plateau near South Mam, having crossed in ascending some 200 feet of soft sandstones and marls. Found the top of the plateau very rough and covered with masses of broken basalt and matted with timber. Reached the summit of the Mam by 3 o'clock and had a good view of the surrounding plateaus, of the valley of the Grand, of the Great Hogback and of the Elk Mountains. The mam-shaped summit is some 200 or 300 feet above the mesa and is of dark, coarse, large celled basalt. I observed that it had been fortified by Indians and found arrow points and flint chips. The defenses were half a dozen shallow pits about the top, with low lines of loose stones laid along the outer edge. Commenced the descent within an hour of sunset and by dark reached the lower border of the timber and discovered some five miles down a valley a camp fire. Two hours later came to the fire and found only an Indian camp. One of these could speak American fairly, but they had seen nothing of our party. We then set out on the trail south, supposing that they had camped short of instructions and at 11 o'clock arrived in the sleeping group. Spencer got us supper and we had a good sleep, although exceedingly tired, having been in the saddle 14 hours and afoot two. There was good moonlight. In this plateau region the upper 200 or 300 feet are generally covered with spruce, below which is a belt of aspens as handsome as possible - below these only oak bushes and other scrub trees and brush and grass.

Sept. 29th: Grand River. Reached the Grand River some

twelve miles away by 11 o'clock - a fine, large river but a good ford. We cross it in a broad valley with slight terraces on the sides. In the bluffs about are the outcroppings of the tertiary sandstones. Leaving the Rio we cross a sageflat and march up a wash and turning over a low ridge to the north pass through the Great Hogback into the valley of the cretaceous shales and by way of a fine canon out by a large creek. The sandstones of the Hogback are cretaceous, some 3000 feet thick and correspond in horizon to the Mesa Verde series. The tertiaries outside are the same or closely resemble the tertiaries of the San Juan about the mouths of LaPlata and Animas. The latter beds are here nearly horizontal, while the sandstones of the Hogback, being firm and heavy, are turned up at a high angle 70 to 80° and trend in a grand curve from the west slope of the Elk Mountains, around to the White River agency. The sandstones of this group seem much metamorphosed and the coal seams too have been burned out, leaving red bands containing cinder, etc. A valley eroded from the cretaceous shales extends along the east base and forms a natural pass from the Grand and White river. A dome plateau outlined by No. 1 and filled in with red beds, etc., lies still to the east of this low valley. An immense deal of the drainage of this plateau gathers in this narrow valley and passes out through the canon gateway mentioned above.

Sept. 30th: White River Agency.

Hayden Geological Survey

Hayden Geological Survey.

Headwaters of the Rio Grande—Successful Operations.

1876

The following private letter from Mr. W. H. Holmes, assistant geologist connected with the division of the above survey, now engaged in exploring the southwestern portion of Colorado, to Dr. Hayden, the geologist in charge, will be read with interest:

HEAD OF RIO GRANDE, September 7, 1876.

—We are camped on the Rio Grande so near the source that it is only a small stream,—so small that a man might step over it. Since parting with you at the base of the Sierra Blanca we have made two great summits without missing a day, and making altogether the neatest connection throughout that can be imagined. You desired me to give full details, but I may say truly to begin with that what we have seen and done belongs rather to the generals than to the particulars. We have seen a country which is built on a large scale, and in a large or general way we have seen it. Each day's work has been full. The second day after parting with you, we reached Del Norte, leaving behind us the little-praised yet interesting and beautiful San Luis park. On the following morning we organized a small party for a side trip to the Summit district. We found a good wagon road leading up to the mines—some twenty-five miles—and passed on beyond to the base of a mountain (called by Clarke, of the Wheeler party, Mount Blaine), making a march of nearly forty miles. On this peak Mr. Wilson wished to make one of the primary triangulation stations.

Next morning, September 1, we were on the summit by 10 o'clock. Mr. Wilson succeeded in making a fair set of observations, and I spent a couple of hours making a detailed sketch of the Trachytic mountain region to the south. This region is the southern extension of the Summit plateau, (on which is situated the mining district,) and lies between the Rio Grande basin on the east and the upper San Juan valley on the west. The entire plateau is high, most of it being above or near timber line, and is rather higher on the borders, especially so on the San Juan side. We thus have a large area which is but poorly drained and hence retains much water and abounds in immense tracts of bog or swamp lands. The wetter portions in the broad upland valleys are covered with a dense growth of swamp grasses and willow bushes, while the drier parts have considerable fine forest. Our station, which reaches an elevation of 13,000 feet, is situated on the continental divide, but lies on the west side of the plateau overlooking the cañons of the upper San Juan. South of it is Banded mountain, occupying the center of the great group shown in my sketch. To the west and northwest is spread forth one of the grandest mountain landscapes that I have ever had the good fortune to behold. Under us are the deep rock-walled and timbered cañons. Rising beyond these, with picturesque forms and fine colors, is the first group of the San Juan mountains, of which the Rio Grande pyramid seems to be the culminating point. Beyond this, and towering above is the second group—the famous quartzites—presenting an astounding array of lofty needle-like points, and combed ridges. This group I have since seen from a nearer point, and shall subsequently describe more fully. The view to the north and east present nothing out of the ordinary run of mountain scenery.

The Sangre de Cristo range could be seen beyond the San Luis Valley and Saguache and Uncompahgre ranges were in plain sight to the north. The formations here are totally trachytic and together with the very valuable mines of the district will doubtless be fully described by Dr. Endlich in his report for 1875.

Having successfully finished our work in this district, we set out for the Rio Grande, passing down a small branch to the south fork and thence reaching the main camp sixteen miles above Del Norte. In three days we had traveled upwards of eighty miles, besides making a successful high mountain station. Our next station was to be the Rio Grande pyramid. On September 3, we marched about twenty-five miles up the Rio Grande, and on the following day reached the base of the peak, thirty miles farther. Our camp was near the source of the Pinos river, a tributary of the San Juan. An Indian trail runs over the pass. By this route we entered the San Juan basin last year. On the morning of the 5th we ascended the pyramid. At timber-line we encountered a severe rain and snow storm. The sky cleared again soon, and by 11 o'clock we were on the summit, but just in time to encounter another and much more severe snow storm. For nearly an hour we lay on the leeward side of a small monument, trying to keep warm and congratulating ourselves that we would know the way up to-morrow. Soon after 12 the clouds began to break, and glimpses of the mountain could be had. By 1 o'clock we were at work, and as the different groups came out partially or entirely, we snatched, as it were, from the jealous and unwilling storm our observations and drawings. The one great feature of the day, to me, was the view of the quartzite group, which lay immediately to the west. The view is one in a thousand, and you would have been lost in admiration and amazement. You have seen a thousand panoramas, but none like this. I predict that when you see my sketch you will be highly pleased. But what are these mountains like? If you should, in your imagination, put together in one small group, perhaps twelve miles square, all the heights and depths, the rugged precipices and polished faces of rock and all the sharp pinnacles and deeply indented crests and twenty times the inaccessible summits that both of us have ever seen you would not have a picture equal to this. Words can hardly express sufficient to enable me speak in hyperbole of this unparalleled group of peaks. My poor sketch made through the rents in the clouds will tell you best what they are like and a sketch of such a subject must be but a feeble, a very feeble, expression of the truth as you must fully know.

Beyond this group to the south appear the La Plata mountains; and to the north the San Miguel and Uncompahgre. The great summit of the latter range impresses one greatly with its height and if appearances count for anything the great Blanca has a dangerous rival. The mountains to the north have a covering of snow, but otherwise attract but little notice from this point. The Rio Grande pyramid is a fine peak named so on account of its symmetric pyramidal shape. It is composed entirely of trachyte and is easy of access. The surrounding valleys or cañons are cut sharp and deep in the massive bedded trachyte. The character of the country is very like the East Yellowstone and Clark's Fork region.

We are now one day's march from the base of the pyramid and to-morrow shall pass through Silverton on our way to La Plata. I hope to get another look into the quartzites to-morrow morning. I have told you but little and that in a very unscientific way, but I hope you will excuse me. The party are all well and in good spirits. Five peaks are done and five or six yet to do.

W. H. H.

BUREAU OF AMERICAN ETHNOLOGY
9th Annual Report, 1887-88

"During the months of August and September Mr. W. H. Holmes was engaged in studying the antiquities of Jemez Valley, New Mexico. This valley is tributary to the Rio Grande on the west, and its middle portion is about 50 miles west of Santa Fe.

Fifteen important ruined pueblos and village sites were examined. They correspond closely in type to those of the north and bear evidence in most cases of pre-Spanish occupation. Besides the larger ruins there are a multitude of minor ones, small houses and lodges of stone, scattered through the forests. Mr. Holmes carried his investigations of the ruins of Colorado and New Mexico as far south as Abiquiu, which village lies at the northern end of the group of mountains in which the Rio Jemez takes its rise. His work of the year, therefore, enabled him to connect his studies of the northern localities with those of the south, in which the numerous modern pueblos are situated. The chain of observations thus secured is of value in the study of the art products of the vast region formerly occupied by town-building tribes.

Particular attention was given to an examination of the ceramic remains. These constitute one of the means of developing the history of the pre-Columbian inhabitants. A large series of specimens was forwarded to the National Museum" (Page XXIX)

"Mr. William H. Holmes has had charge of the illustrations intended for the Bureau publications, as in previous years, and has, so far as possible, continued his studies in aboriginal art and archeology." (Page XXXVIII)



27. NATURAL BRIDGE. LAKE CREEK.

Wm. Holmes



218. CAVETOWN ON THE RIO DE CHELLE, ARIZONA.



Sandwich House



Navajo place where



a Hill Town village

Cliff Dwellings

Pueblo Canyon

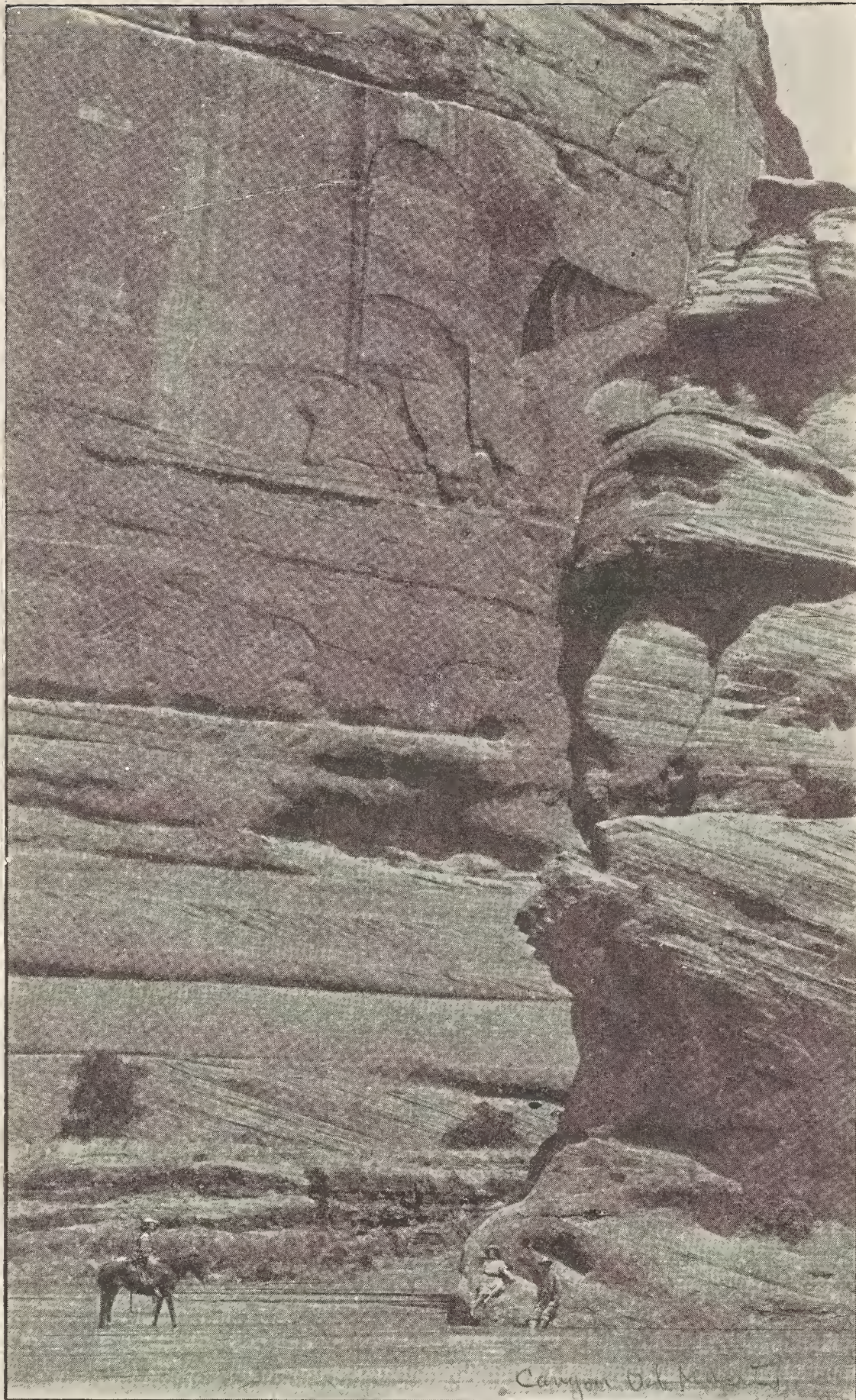
Sierra Ancha

Apache Trail

Arizona



Hope



Canyon Del Muerto



Mesa Verde, New Mexico

EXPLORE PART

100

Camry Lane





Moncos?





The crown prince of Sweden & his wife
visited the city in 1927.



part

The group photo of Sweden + her staff! Home crowd. A. P. 1937
 with her son



Chet's Palace - Kucba, Yucatan



From a photograph, copyright 1900, by E. S. Curtis.

Returning from the field.

INDIANS OF THE STONE HOUSES*

By Edward S. Curtis

ILLUSTRATIONS FROM PHOTOGRAPHS BY THE AUTHOR



THE average reader, when thinking of the American Indian, thinks only of the statuesque, picturesque, buffalo-hunting Indians of the northern prairies, or, perhaps, the gayly dressed warrior in his bark canoe travelling the waters of the lakes and streams of the forests. These characteristic types do form a good portion of our Indian people, but far from the whole, and decidedly not the most interesting.

When the mail-clothed Spanish soldiers

of fortune forced their way into the desert lands of the South-west, the land that we now call Arizona and New Mexico, they found it dotted here and there with human habitations, habitations apparently as time-worn as those of old Spain. They were communal structures of stone, cliff-perched, their six stories or more towering high toward the blue dome, so high that when we look up to them from the plain they seem to be on the level with the high-soaring eagles. For miles across the outlying desert or along the valley stretched their farmlands. Peculiarly administered communities they were, with so advanced a

* See former articles by Mr. Curtis in SCRIBNER'S MAGAZINE for May and June, 1906.



From a photograph, copyright 1906, by E. S. Curtis.

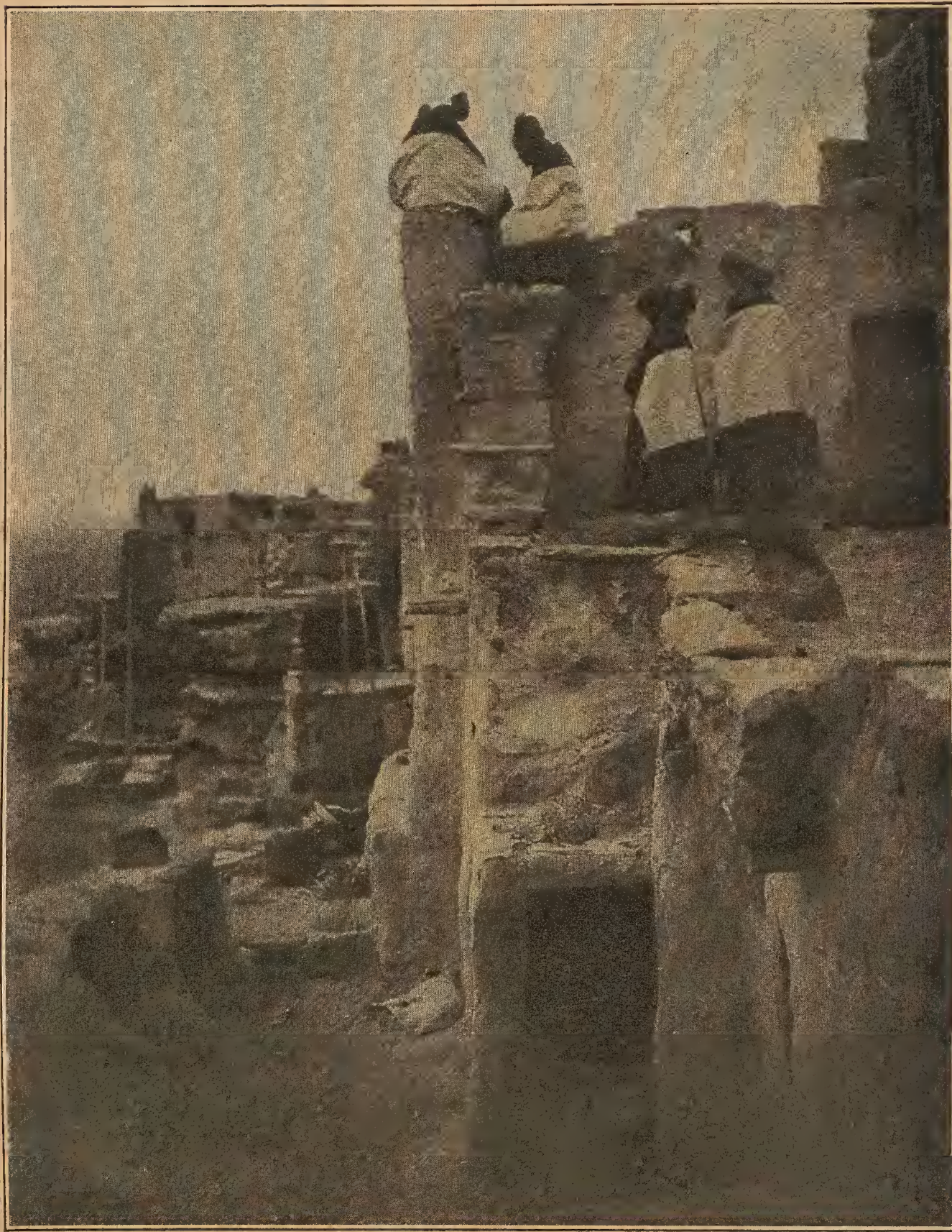
The mealing trough—Hopi.

form of government that the remnants of it, though shadowed by three centuries of white men's greed and politics, remain praiseworthy to the present day. To quote Lummis, in "Poco Tiempo," "There were many American Republics before the sailing of Columbus."

The booty-loving Spaniards, who first found this land, were in search of the seven cities of Cibola, with their fabled hoards of gold and portals of turquoise, the cities of the many-times-told and exaggerated tales of the Negro Estevan and the Friar Marcos. Rather than the expected riches, equaling those of the Incas in the Perus, they found no gold and little turquoise, only simple Indians without riches, but with a life far advanced from that of the nomadic tribes, possessed of many arts and crafts. They were tilling fields of corn and beans, and from wild cotton wove cloth which would do credit to any art-loom of to-day, and fashioning from clay utensils of superb workmanship, decorated with highly con-

ventionalized designs; they were tanners, dyers and workers in gems, and beyond all the arts of their domestic life was the ritual of their ancient pagan one, a life exceedingly rich in religious ceremony; while their astronomical and astrological lore is even to-day a thing of wonder to the student.

The women held legally a higher place in the domestic scheme of life at the coming of the white man, three centuries ago, than is granted by the laws of many states to the white mother and wife to-day. The Pueblo wife was the owner of the home and the children. Descent was traced through her clan, not that of the father. In case of a defection of a husband, the wife could divorce him; if he returned to the home to find his personal belongings placed outside the door, it meant that her decree of divorce was sealed; in which case, if he saw fit to apply to the council in hopes of a reversal of judgment, he might secure sympathy and even assistance from her clan, but not from his own.



From a photograph, copyright 1906, by E. S. Curtis.

Hopi life—Walpi.

of his coming to his own children. Then, if they are to fight, he will lead them. They have believed this for ages, and they wait for the signs in the sky. Meanwhile, they are a peaceful people who go not forth to battle, but when assailed they have written their names large in the blood of the Apache, Piute and Navajo.

Of the stone villages where the dwellers still live and go about their daily tasks, much as they did a century ago, are the seven cliff-perched villages of the Hopi: Walpi, Shongopovi, Shipaulovi, Mishongnovi, Sichomovi, Hano and Oraibi; Acoma, the beautiful, whose only rival is Walpi of Hopi-land; Zuni, all that is left of the seven cities of Cibola; Laguna, of a later day, but conveniently skirted by the railroad, giving the tourist a glimpse of the Pueblo life without the effort of leaving the Pullman; Isleta, with its primitive and interesting life, also close to the railroad; Sandia, San Felipe, Santa Ana, Sia, Jemez, far up in the mountains, Pecos, Tesuque, San Ildefonso, the almost extinct Pojuaque; Nambé, old and interesting, but fast blending its blood into the Mexican; Santa Clara, San Juan, Picuris, and lastly Taos, the courageous and primitive, nestling in the forested foot-hills of the Don Fernandez Mountains.

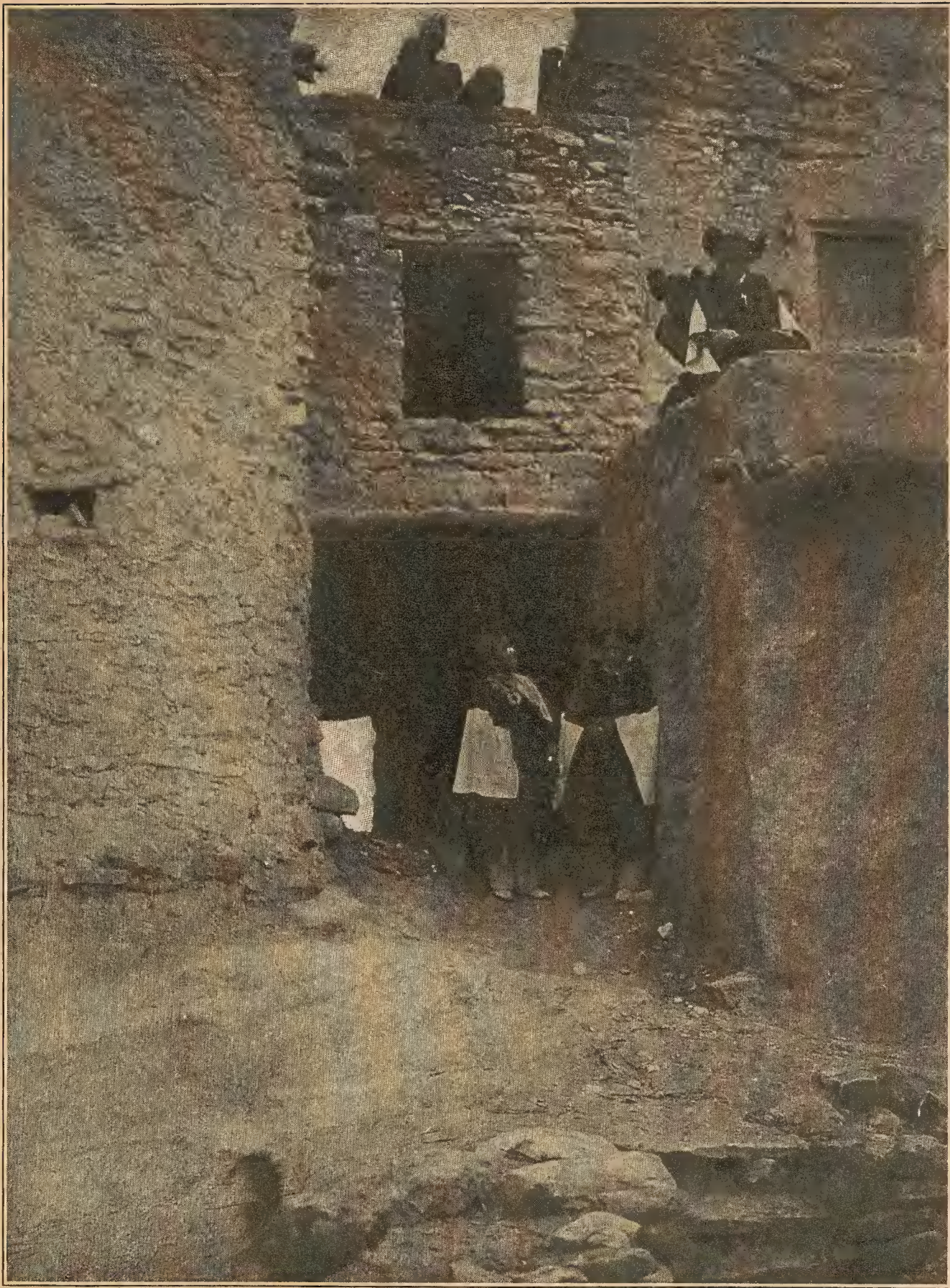
At none of these villages can the interesting and picturesque life be studied as well as with the Hopi. Their life is rich in ceremony and mythology and they are comparatively less secretive. The reader must not suppose by this that the Kiva, their primitive sanctuary, is open to those who would enter; far from it! but by long and serious effort much can be seen and gleaned. Their life is one intricate network of ceremonies, each following the other in their regular order. Scarcely a day of the year but the naked bronze-skinned participants of the holy orders can be seen running from Kiva to a far-away spring, to deposit their prayer plumes at the life-giving waters, that the gods of the North, West, South and East may see and answer their people's prayer. The Hopi home is in the thirsty desert land where water is life. What more natural than that all live springs should be prayer shrines for receiving the *pahos* as visible offerings!

The greatest of all the Indian ceremonies is the Snake Dance of the Hopi; in it we see the devout followers of the primitive religion of their forefathers going into the desert and gathering snakes, which are to them sacred. Day by day, through the mystic circle of Four, they gather and carry them back to the Kiva. Here, in the underground chamber, lit only by the opening in the top, we see enacted strange rites,

which must equal those of the snake-charmers of India; and then, at the sinking of the sun on the ninth and last day of the ceremony, they carry the snakes, as messengers to the gods, back to the desert whence they were gathered.

The village and home life of the Hopi is almost as interesting as their ceremonial one. At the coming of the yellow light in the eastern summer sky the village crier goes to the housetop and, in a loud voice, cries out to the village the plans of the day, urging the men and women in their duties to the community and to the family. He is more than a newspaper. He is the executive, in direct communication with every subject, adult and child. By the close of the morning exhortations to the people, the men are preparing for the work in the field. The burros, two or a dozen, as the case may be, are driven from the small stone corrals at the mesa's edge. The Hopi uses one as a beast of burden and drives the others before him. The way is down the winding trail cut in the rock cliff and across the sand-dunes far out to the tiny farms in the desert. These farms are small spots of ground in which are grown corn, beans, melons, squash and pumpkins, and are usually in the drifted sands of low-lying spots in the desert, situated at points where they can catch the freshet water as it flows down from the table-lands above. Patiently the Hopi farmer tends his crops, and daily, thrice daily and hourly, prays to his gods that the low-hanging clouds may come walking and pour out their life-giving showers.

The men are but started for the fields when the women take up the labors of the day. From the homes we hear the low song of the women at the mealing-troughs. These mealing-troughs are at one end of the living room. The grinding stones are placed side by side, and here the maids and matrons take their position and, with rhythmic stroke, crush the corn into fine meal. With the sound of the grinding comes that of the accompanying song. One begins with the yellow light before the sun appears; then comes the song of the approaching sun, followed, perhaps, by the flying of the butterfly, and so on. Once a group of women were singing the songs that I might make a record of them. A neighboring woman came in anger to the door,



From a photograph, copyright 1906, by E. S. Curtis.

At the portal—Walpi.

reservoirs, one fed by a tiny spring. The women, with beautifully decorated earthen jars poised gracefully on their heads, coming and going from the wells, make a picture long living in the mind.

The Acoma fields are far away at Acoma. There, during the summer, they dwell in tiny box-like adobe houses and till their small but well-kept farms, journeying back to their cliff-perched home for all ceremonial occasions. They are, as a people, and have been for generations, devout followers of the Catholic Church. This fact has not, however, in any way seriously affected their primitive religion or crowded out one of their pagan ceremonies. They are a positive argument that a people can be loyal followers of two religious creeds at one and the same time.

In the valley of the Rio Grande we find many small villages. The buildings are usually one story in height, and, from their location in the valley, lack the picturesque features of Walpi and Acoma. Here, differing from Hopiland, and like Zuni and Acoma, farming is by irrigation. Compared to the Hopi, it is princely. Compared to the white man's farming, theirs is petty. Prehistoric irrigation by the dwellers in this region was probably of the simplest order—small ditches drawn from the stream, the water dipped in earthen jars and carried out to the crops. This form of irrigation necessarily meant that very limited areas could be cultivated. Slight evidence is seen which would lead us to believe that Indians of prehistoric time used other system than this in irrigating their fields. In the valley of the Gila, even where the ditches were miles in length and carried a considerable volume of water, it is probable that the actual application of water was made by carrying it in jars rather than by flooding. To look at the cultivated portion of the Rio Grande valley from a slight elevation, it is a field of grain and other crops divided into squares of slightly different shades of green, reminding one of a patchwork-quilt carried wholly in one color. Their principal crop is wheat. This they care for in the simplest way: when ripe, they harvest it with a hand sickle, and the gleaned crop is gathered at the threshing ground, which is simply a plot smoothed and enclosed with a rough fence. At the time of threshing, the

horses belonging to the family are turned into the enclosure and driven around in a circle until the grain is threshed from the straw. Then with forks they separate the straw and chaff from the grain, sift it in a large box-sieve with a perforated bottom made of rawhide, and then, for the final cleaning, take it to the small streams or canals and wash it. In this washing the grain is taken in large coarse baskets, carried down to the water and stirred about in the basket, the chaff and lighter matter floating away with the current. The clean grain is then spread out on cloths to dry. This drying must be finished the day of washing, and to hurry it the grain is taken in baskets, held high in the air and let sift slowly to the ground. This is repeated time after time until it is thoroughly dried. For daily use, such as is wanted they grind on the hand mealing-stone or metate.

Here, too, among these villages we see the church religion blended with the primitive one. Generation after generation of patient padres have worked and laid down their lives, many in their own red blood at the hands of those whose souls they thought to save. The Indian cannot yet see how or why his soul should be lost. To-day, when we talk to an old man of the village of religion he will tell us, with certainty, that he believes in the true God of the priests. "Yes, I know you believe in the true God, but the story of that God is all written in the big Book. I want to talk with you of your own God, Poseyamo, who lived once on earth and who went long ago to the South." His face lights as if he, himself, was already entering the eternal paradise of his fathers. "Do you know Poseyamo? Tell me about him, and tell me, will he soon come back to care for his children? The signal fire burns at the old shrine on the one night of each seven. It has burned thus many lifetimes to show him that we are faithful and that we wait. Tell him to come soon or I will not be here to see him." And so it is; that which their forefathers accepted for policy's sake they have grown, in a measure, to take for granted, but cling to the old with but slightly shaken faith. They plant their crops as of old, by the star which governs each special growth. The Navajo plants his corn by the Pleiads, but the Pueblo farmer

plants by the corn star, or the wheat, or the star of the melons, on the day when the cacique gives out the word that the stars say that planting should be done. Only the cacique and one other man knows the potent day of each star, and he, the reader of the stars, is kept secret from the tribe. One may not read their movements and tell the secrets in any but matters of great tribal importance.

Taos is, if anything, more conservative than the others, and is delightfully primitive, and the blood of its people exceptionally pure. Tribal laws stand firm against intermarriage with blood not their own, and the same tribal laws forbid all white man's garments. The youth can go to the village to our schools and learn the white man's ways and cunning in order to be better fitted to cope with encroaching neighbors, but when he returns to take up tribal life he must leave outside the village gates his dressy school uniform and wrap himself in a blanket of the tribe.

Taos is built where the mountain forests

come down to meet the plains. A beautiful, and to them sacred, stream flows down through the forest's cool shadows and passes through the heart of this village. At its forested bank, above the village, the women get the water for home use, and on its banks below are gathered groups of matrons and maidens washing the clothing of the family, for these are a cleanly people. The forest above the village is, in a measure, like the stream, a sacred one, and is jealously guarded by the men of the tribe, and in its great depths are held many of the old-time rites, rites never seen by any except members of the order or tribe.

Spring, Summer, Autumn, or white-robed Winter, this wonderful old forest is a master creation, and the like can be seen nowhere else. You, who say there is nothing old in our country, turn your eyes for one year from Europe and go to the land of an ancient yet primitive civilization. The trails are rarely travelled, and you will go again.



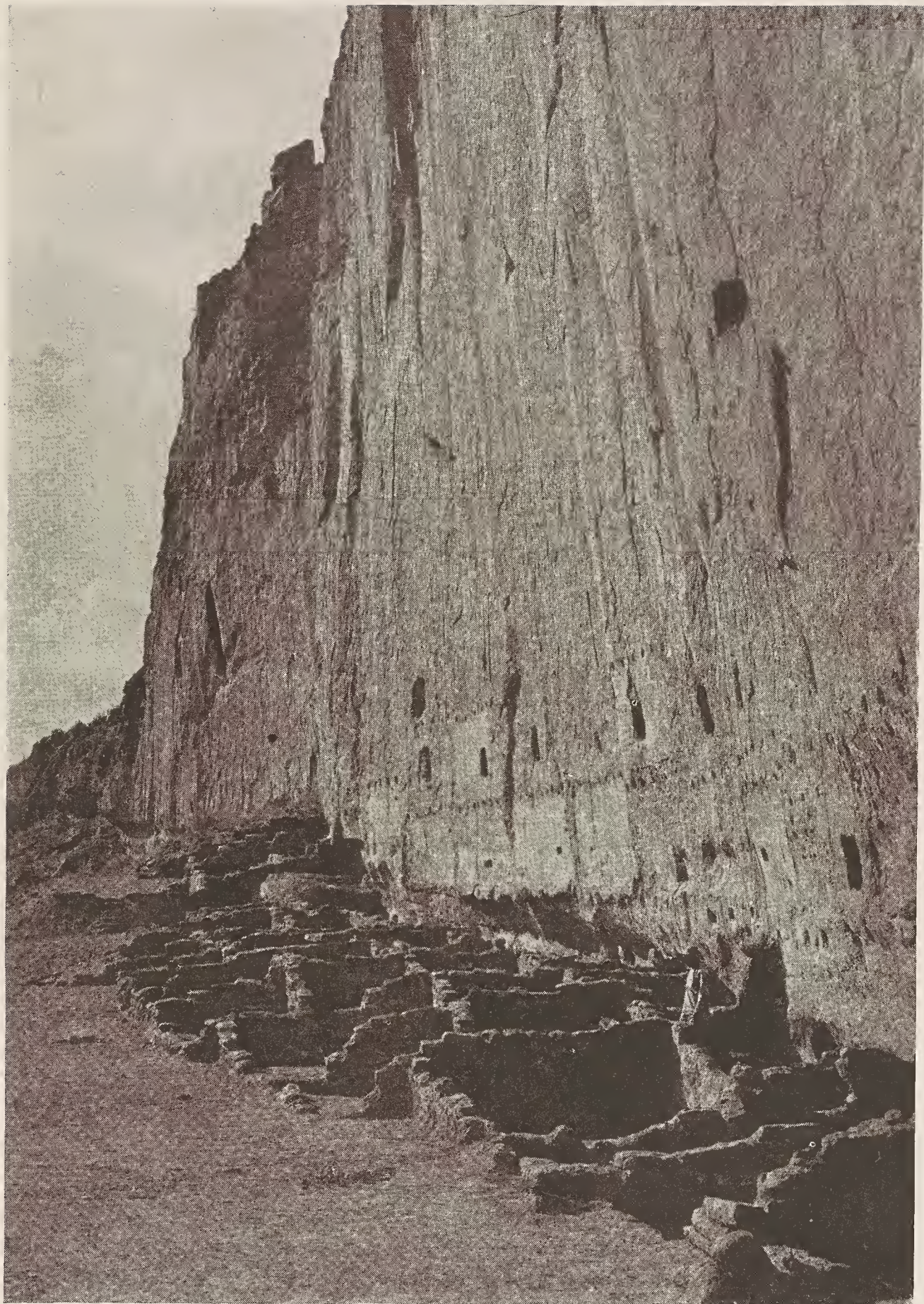
From a photograph, copyright 1904, by E. S. Curtis.

When evening comes on.



MOONRISE IN A WOOD *By Theodora Taylor*

Twilight,—a darkling wood.
The ancient trees, like hoary sentinels
All silent stand. Down the dim aisles
The distant, fading sky of dying gold
Is veiled in purple mist. Above, the heavens
Of darkest sapphire; one clear star
Already looking forth expectantly.
The winds are hushed, the very leaves are mute.
The purling brook singeth in undertones,
Her daylight song too loud, too unrestrained
To match the universal hush.
Lo! where she comes, threading the leafy ways,
Cynthia, the Goddess, casting silvery rays!



Alone in a crypt in the face of the northern cliff of the Tyúonyi cañon, now known by its Spanish name, Rito de los Frijoles, in New Mexico—the home of an ancient cliff-dwelling people—was found the skeleton of an Indian maiden about eighteen years of age. The body was wrapped in cotton cloth and covered with a robe of fur and feathers. This suggested the poem, "The Cliff Maiden," p. 91.



Figure 25.—Sculptured figures of a type employed in the embellishment of ancient Maya temples.

worked out by native sculptors, using life forms with which they were familiar or monsters created by their fertile imaginations.

With respect to the manner in which elements of Asiatic culture could reach middle America in the early Christian centuries—the period of Buddhistic propaganda—it may be said that the sea going capacity of the ships of that period was very considerable, and it is thus not impossible that by design or by accident Buddhistic devotees should have landed upon the shores of America. Neither is it impossible that these devotees of a creed, determined to carry their doctrines to the ends of the earth, should not have coasted eastern Asia, reaching the continent of North America by way of the Aleutian Islands. The journey from Alaska to middle America would be a long one, but not beyond the range of possible achievement for the fanatical devotees of Buddhism. The suggestion that the voyage may have been made by way of Atlantis is deserving of little attention,

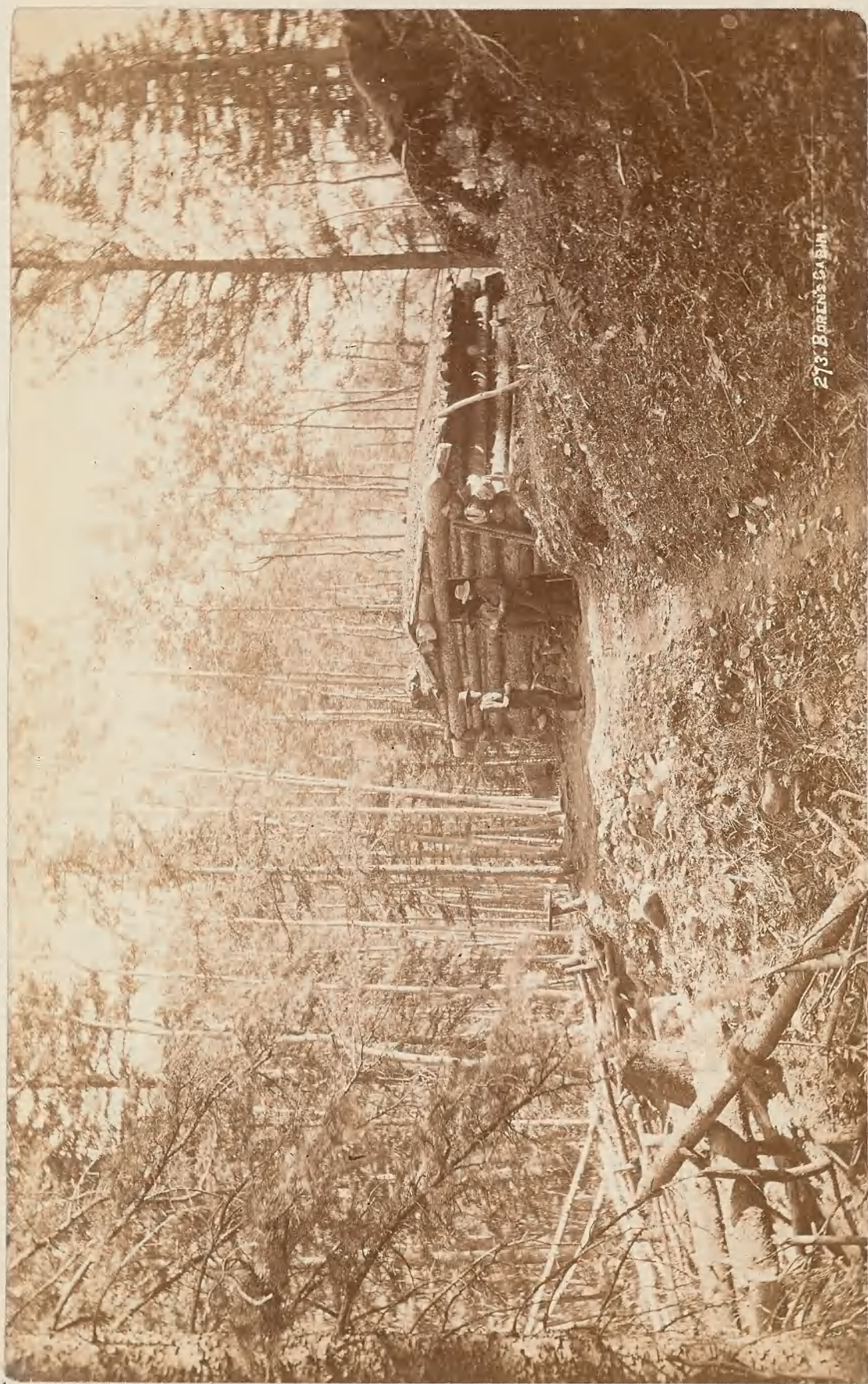
and that the hypothetical sunken continent of the Pacific may have served as a bridge is deserving of no attention, since the period of sinking, if it ever occurred, would doubtless antedate the period of man's occupation of either hemisphere.

The writer of this sketch of a vast subject wishes to say in conclusion that he appreciates its many shortcomings, for it is intended to be suggestive merely rather than final; but he finds gratification in the thought engendered by the study, that whereas, but a few generations ago our world outlook was exceedingly limited and our positive knowledge but a hint of the whole truth, the time is fast approaching as a result of the ever widening scope of scientific research when we shall comprehend at a glance the world and its inhabitants, present and past, with the ease with which we now contemplate our local environment or with which we view a story thrown upon the screen.

U. S. National Museum.



John Moss - guide & Ingersoll
 (Earliest Correspondent
 1876)
 First example of ancient cliff dwelling
 from this region
 Mancos Canyon



To Peter West Carbon 1874

PUEBLO BONITO AND ITS ARCHITECTURAL DEVELOPMENT

BY NEIL M. JUDD

PUEBLO BONITO is a prehistoric Indian village situated in Chaco Canyon, northwestern New Mexico. The National Geographic Society pursued annual investigations in Pueblo Bonito from 1921 to 1927 with the result that the ancient settlement has been laid bare and much of its history recovered. From its archaeological record, we judge the village to have been abandoned approximately one thousand years ago. Its builders and former inhabitants have not yet been identified with any living Pueblo people.

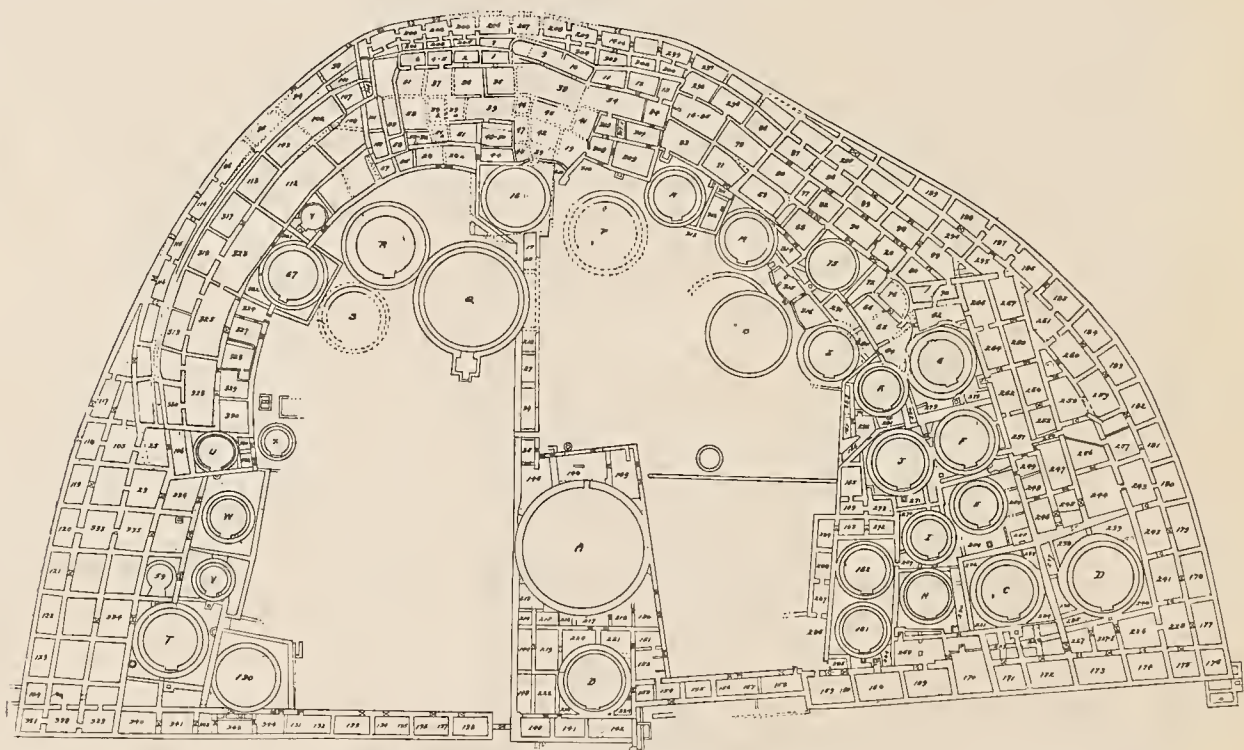
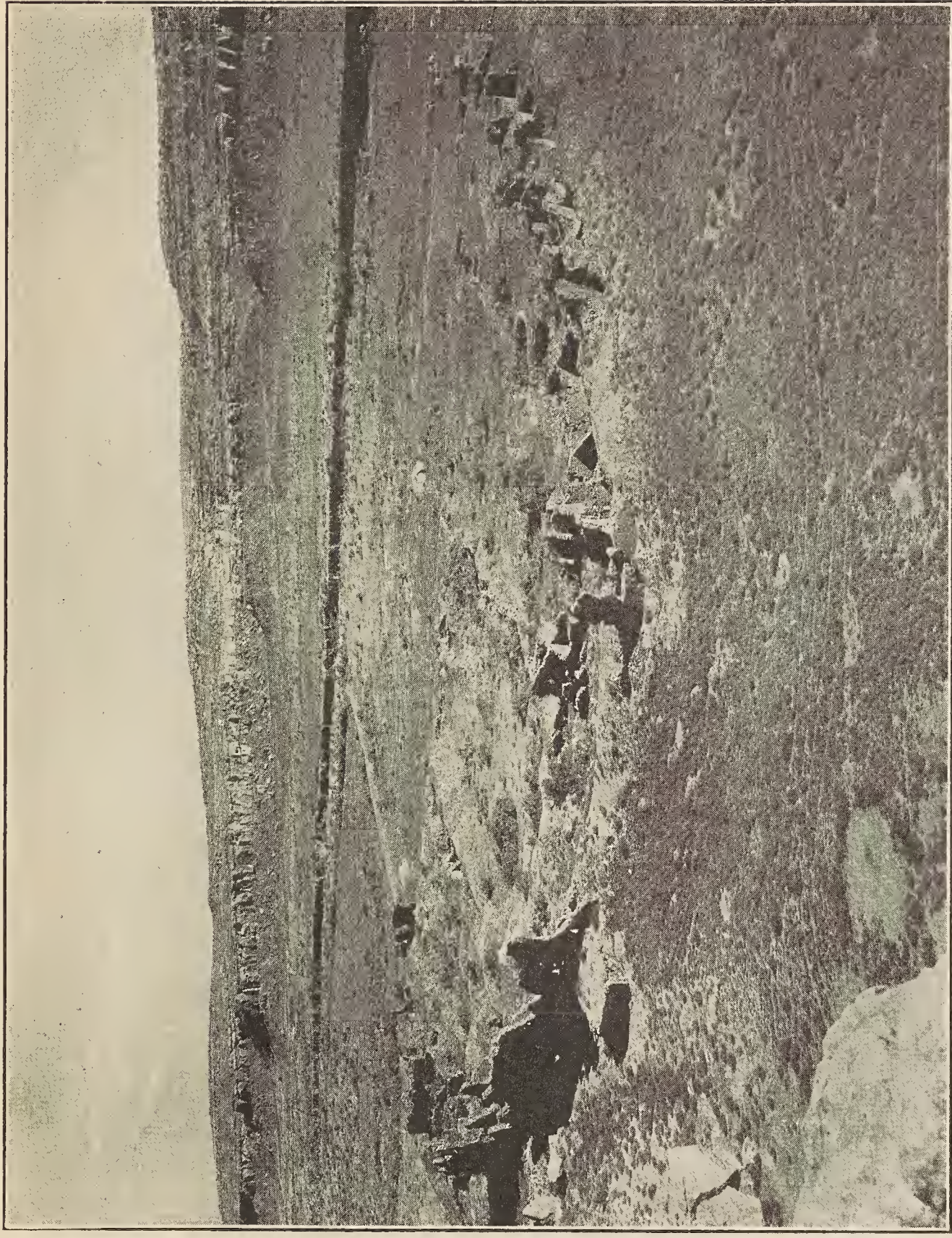


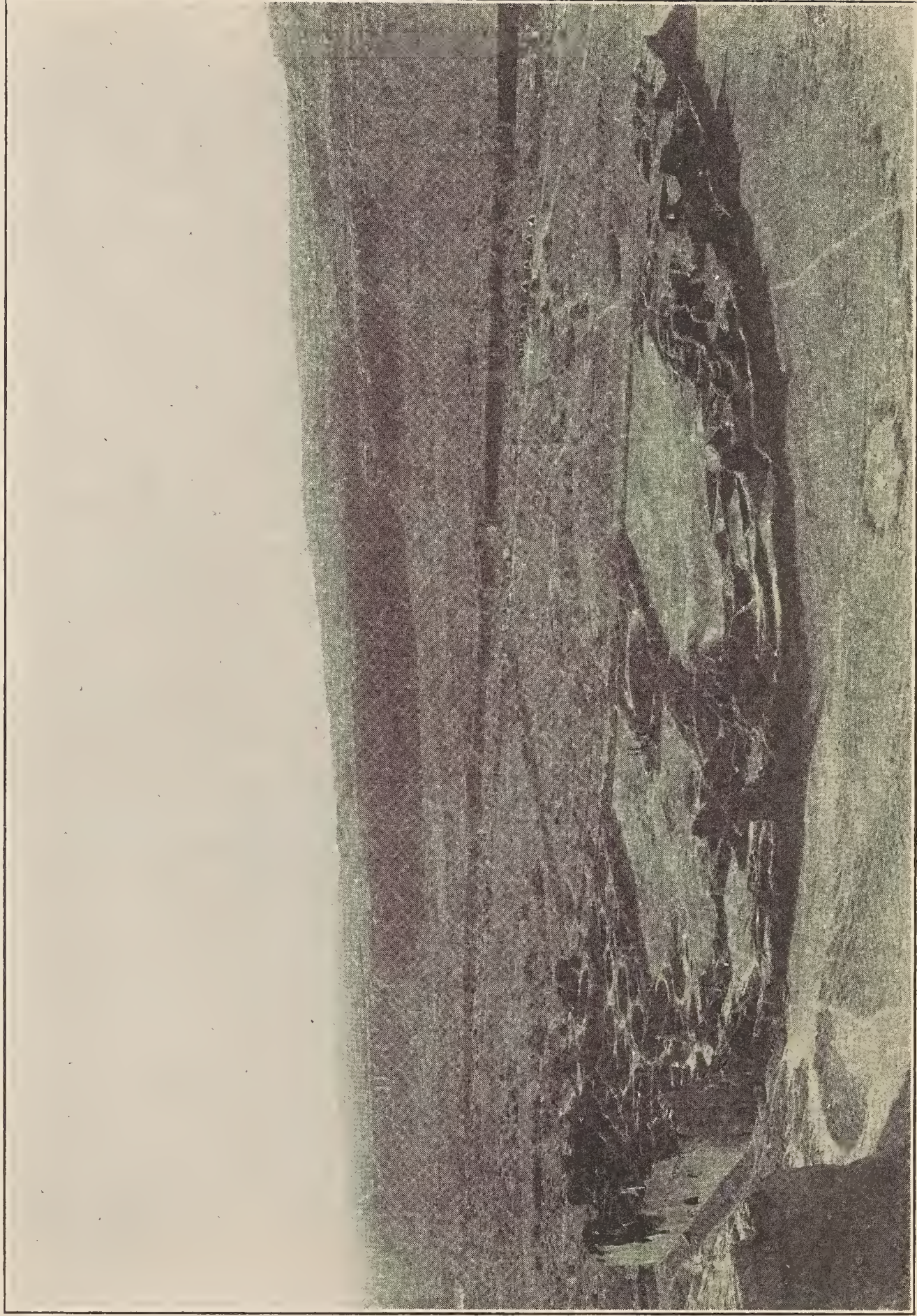
FIG. 1—GROUNDPLAN OF PUEBLO BONITO

We think of Pueblo Bonito as a village, and so it is—a whole village within a single building, semicircular in plan, and covering more than three acres of ground. The straight south side of this communal structure measures 518 feet in length; in its convex north wall, portions of fourth-story rooms still stand. We may infer that, in its heyday, Pueblo Bonito included approximately eight hundred rooms and sheltered a population of between twelve and fifteen hundred. These were Indian farmers; they cultivated maize, beans, and squash in neighboring fields, watered chiefly by midsummer floods. The Bonitians had no beasts of burden, no domestic animals other than turkeys and dogs, and no objects of metal except small copper bells introduced through commerce from Mexico.

Omitting from our present theme all consideration of their remarkable cultural achievements, we may note that the occupants of Pueblo Bonito included



PUEBLO BONITO AS IT APPEARED IN 1921, AT COMMENCEMENT OF THE NATIONAL GEOGRAPHIC SOCIETY'S EXPLORATIONS. (PHOTOGRAPH BY COURTESY OF THE NATIONAL GEOGRAPHIC SOCIETY.)



PUEBLO BONITO AT CLOSE OF THE 1924 SEASON, BEFORE EXCAVATION DISCLOSED THE EXTENT OF SUBFLOOR AND SUBCOURT WALLS RELATED TO EARLIER PERIODS OF CONSTRUCTION. (PHOTOGRAPH BY COURTESY OF THE NATIONAL GEOGRAPHIC SOCIETY.)

two distinct peoples. These were entirely unrelated; they were emotionally unlike, despite the basic similarity of their respective cultures. Culturally, one of the two had advanced far beyond the other. So wholly obvious are the differences in their architecture—and the product of their minor industries differs in equal degree—that we are seemingly justified in assuming these two peoples actually spoke different languages. Yet, they dwelt together here, in apparent harmony, for many generations.

The first of these two groups, the actual founders of Pueblo Bonito, had built for themselves a composite, terraced structure and had occupied it for a considerable period before the second group came to join them. It was this latter group, soon to dominate the settlement, that subsequently brought fame to Pueblo Bonito and created for it a prestige, the influence of which was felt as far away as the Pacific Coast and even the valleys of central Mexico. The first group produced a single kind of masonry; the second, more progressive, created three kinds.

These four types of stonework, the most noticeable feature of Pueblo Bonito's evolving architecture, enable us to trace the growth of the community and gauge the part played by each of the two component elements in its population. The four methods of construction may be described briefly, as follows: The first—and I would repeat that this was employed exclusively by the original settlers—consists of rather large tabular sandstone slabs, usually chipped on the edges, and laid in an abundance of clay mud. (Pl. III, Fig. 1.) The second type, which is that first utilized by the newcomers to Pueblo Bonito, is characterized by sizeable though irregular blocks of soft, friable sandstone pecked or rubbed smooth on the face only and chinked with innumerable spalls of harder, darker, laminate sandstone. (Pl. III, Figs. 1 and 2.) The third type, developed from the second, features the same carefully dressed blocks of friable stone, but laid in bands a foot or more apart and separated by close-lying laminate fragments about one inch thick. (Pl. IV, Fig. 1.) In the fourth method of construction the dressed blocks were entirely eliminated, laminate sandstone being exclusively employed. (Pl. IV, Fig. 2.)

Now masonry of the kind first mentioned was built with stones approximating the wall thickness and their irregular, chipped edges were unevenly covered by a thick layer of clay plaster, pressed into place by the finger tips of the builders. This was the characteristic stonework of the original settlers; it did not change perceptibly throughout their residence in Pueblo Bonito. In marked contrast, every wall erected by the second, or later, group consisted of two finished faces with a core of rubble and mud. No other tribe in the United States surpassed these people in constructional ability. Their three successive types of masonry exhibit a perfection of workmanship—even a feeling for the esthetic—rarely observed elsewhere. Yet, except in inner rooms utilized for storage, they covered this perfection and beauty with thin adobe plaster. Because of their superior construction, because so little of their mud mortar was exposed to moisture, these later walls stand today as the best in Pueblo Bonito, or the whole Southwest for that matter.

Even in ruin, the old, original village is easily separable from the remainder of Pueblo Bonito. These older rooms varied in size and ceiling height; their

walls were unsystematic and of unequal thickness. There were no external, first-story doors in this earlier building; its lower roofs were reached by means of ladders which could be withdrawn in case of attack. Within the terraced structure, however, the rooms connected one with the other. Additions necessitated by the normal growth of population resulted in a house cluster of marked irregularity.

When the second group of people came to dwell in Pueblo Bonito they erected, among others, a single tier of houses that partially enclosed the old village and screened its eccentric rear wall. Compared with those they adjoined, these newer dwellings were surprisingly uniform both in shape and size. They stand on a level from four to six feet above that of the older buildings. Besides openings into the adjacent chambers, each room—even those of the second and third stories—was provided with an external door, but these were later blocked and plastered over. Willows, smoothed with infinite patience, rested on selected pine poles to form the ceilings of these houses, in contrast to the brush and gnarled timbers utilized in the earlier chambers.

With introduction of the third masonry type, Pueblo Bonito witnessed a period of comprehensive reconstructional activity. The larger proportion of rooms erected by the second group upon their arrival were demolished and replaced; the plaza where public ceremonies were performed was enlarged and divided. All the extramural developments associated with the community—walls enclosing the two great refuse mounds; foundations to support the detached cliff that threatened to topple upon the village, etc.—contain masonry characteristic of this epoch. The settlement expanded both to the east and west; dwellings were razed with apparent disregard for the human labor involved in their construction or replacement. It seems quite reasonable to suppose that the Bonitians at this time were experiencing their maximum of power and influence. Macaws (*Ara macao*) from the lowlands of Mexico and shells from the California coast were brought by Indian traders on foot and exchanged for the turquoise of Pueblo Bonito. But throughout this period of local development and far-flung commerce, the old conservative group continued to live in their corner of the great communal settlement, almost wholly uninfluenced by the superior arts and industries of their immediate neighbors. Even after the second group withdrew from the village and moved elsewhere the original Bonitians tarried for a time in their primitive homes, pursuing their daily tasks in the manner to which they had long grown accustomed.

The fourth, and final, method of stonework is largely restricted to the southeastern quarter of the pueblo. But this last addition represents a compromise between dominant personalities in the community. Plans for a considerable addition to Pueblo Bonito were well under way when these plans were abandoned for some reason unknown to us and the fourth section substituted. Foundations for this contemplated addition had been extended to a point 500 feet beyond the easternmost wall of the village. Excavation reveals the interesting fact that this abandoned foundation series generally abuts walls of third type construction and immediately underlies those of the final period.

Except in that portion built and occupied by the original inhabitants, evidence of successive alterations is to be found throughout the settlement. Walls



FIG. 1—THE INDIAN STANDS AGAINST A FIRST TYPE WALL; IN THE UPPER LEFT IS SECOND TYPE MASONRY; THE REMAINDER BELONGS TO THE THIRD PERIOD OF CONSTRUCTION. (PHOTOGRAPH BY COURTESY OF THE NATIONAL GEOGRAPHIC SOCIETY.)



FIG. 2—THE OUTER NORTH WALL OF PUEBLO BONITO, SHOWING HOLES MADE BY VANDALS IN FOURTH TYPE MASONRY THAT ABUTS A SECOND PERIOD WALL (AT THE RIGHT) ABOVE WHICH STANDS A SECTION OF BANDED THIRD TYPE STONEWORK. (PHOTOGRAPH BY COURTESY OF THE NATIONAL GEOGRAPHIC SOCIETY.)



FIG. 1—A WALL OF SUPERIOR THIRD CONSTRUCTION,

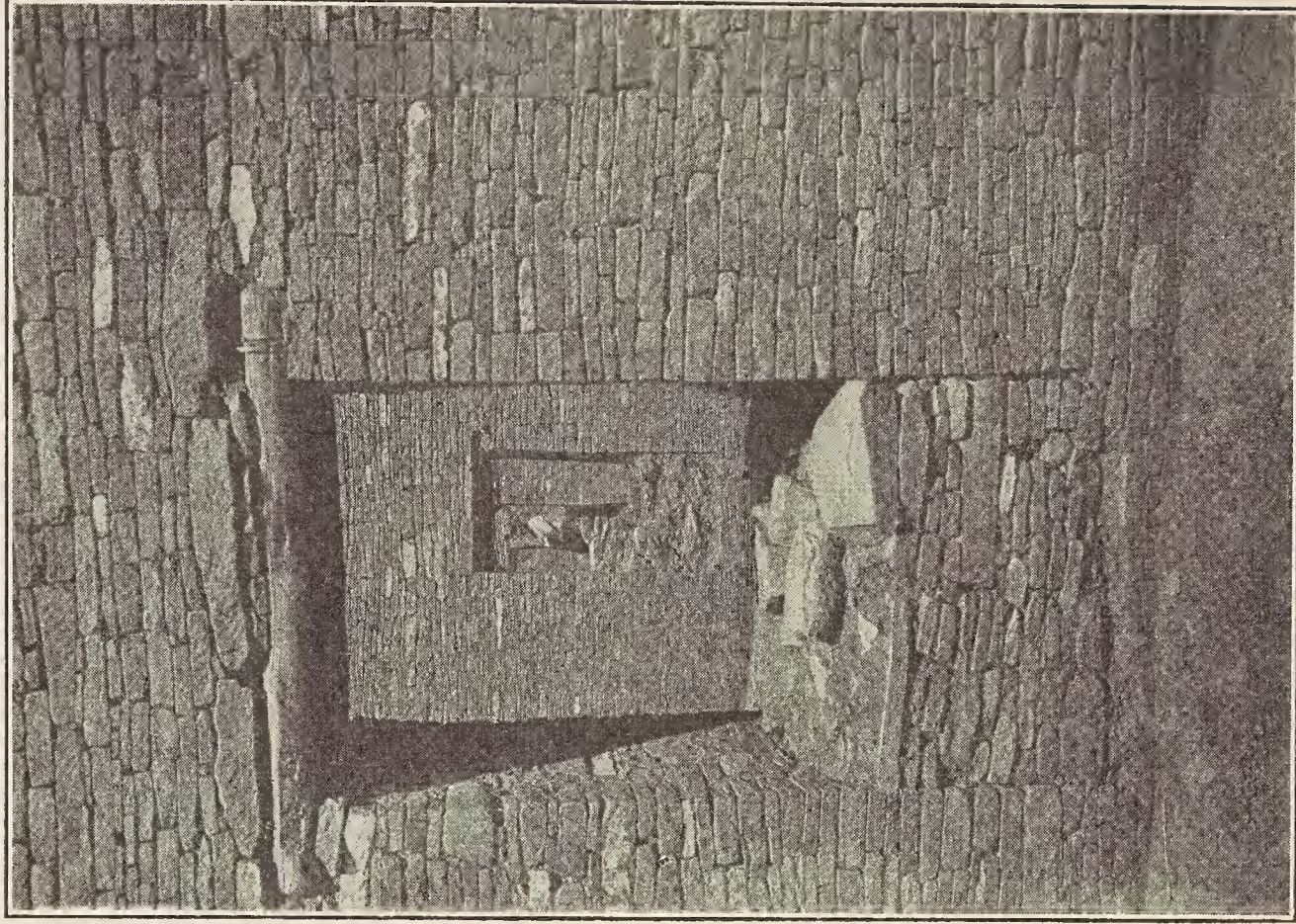


FIG. 2—FOURTH PERIOD MASONRY IN THE SOUTHEAST QUARTER OF PUEBLO BONITO WITH DOORS THAT CONNECT THE ADJOINING ROOMS.
(PHOTOGRAPHS BY COURTESY OF THE NATIONAL GEOGRAPHIC SOCIETY.)

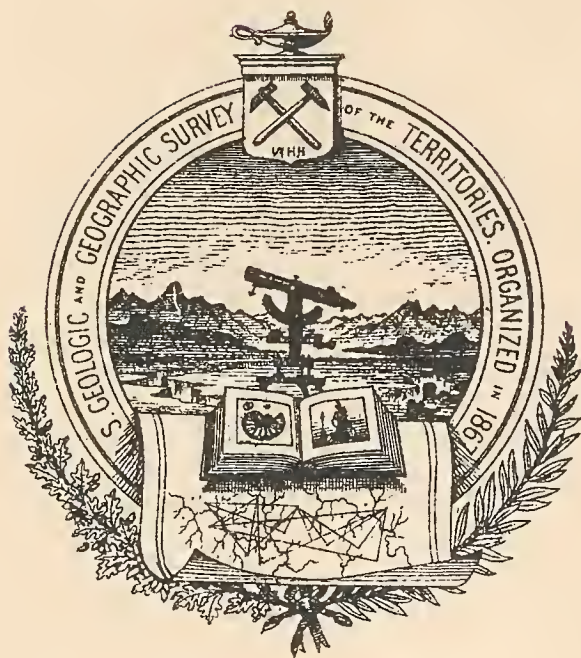
were torn down and replaced; dwellings gave way to circular ceremonial chambers. These latter, ritualistically subterranean and preferably situated at the plaza edge, occasionally encroached upon the secular rooms. In such instances, the walls separating a block of four adjacent dwellings would be razed, the usable stone salvaged, and the lesser débris left where it fell. Upon such accumulations, the new ceremonial chamber would be constructed, its required subterranean position being simulated by the relatively greater height of the surrounding walls. Beneath the houses and beneath the two public courts, foundations and partially razed walls evidence the extent of reconstructional operations during the long continued occupancy of Pueblo Bonito.

In the original village there were no external, ground floor doorways, but such entrances were provided for those dwellings first erected by the second group of inhabitants—entrances which subsequently were closed and plastered over. Now in rooms of third and fourth type masonry, lack of external doors is again noticeable; even the small ventilators, placed high in the walls, were reduced in size or closed completely. (Pl. III, Fig. 2.) From these facts, together with other evidence disclosed during the course of the National Geographic Society's explorations, we may infer the prehistoric Bonitians were subjected to pressure from nomadic tribes and that the village folk were prompted, from time to time, to increase the impregnability of their communal home. Sporadic warfare, together with altered agricultural conditions, appear to have forced abandonment of Pueblo Bonito approximately one thousand years ago—an estimate now being confirmed through study of annual growth rings in timbers salvaged from the ruin. These "tree-ring" studies, in charge of Doctor A. E. Douglass, of the University of Arizona, bid fair to establish our first actual chronology in the archaeology of the United States.

A report covering the seven successive seasons of field-work at Pueblo Bonito is in preparation; its publication should contribute materially to our knowledge of that period in which Pueblo peoples reached the very zenith of their civilization in pre-Spanish times.

William H. Jackson, born April 4th, 1843. Educated in common schools of Troy, N. Y. but left class rooms at an early age to enter the studio of a local artist for instruction in painting. At 17 entered upon a self-sustaining course of portrait painting for photographers, finally locating in Rutland, Vermont. In 1862 enlisted in the 12th Vermont regiment of Inftry of 9 mos. troops and saw active service in Northern Virginia and with the Army of the Potomac. Returning to Vermont continued painting until 1866 when a journey of adventure to the far west was undertaken which included among other things the driving of an ox team in an overland freight train from the Missouri to Salt Lake City and then by mule train to the Pacific coast near Los Angeles. The following year a return trip was made by driving a band of horses over the deserts and plains to Omaha, Neb. Resumed painting here for a while but soon gave it up for out door photography--devoting himself chiefly to the scenery along the line of the Union Pacific Ry, then under construction across the Continent. Success in this undertaking led to his engagement with the Hayden Geological Survey of the territories in 1870 as photographer and to his continuance with that organization until its dissolution in 1879. Noteworthy achievements while with the Survey were the series of photographs of the Yellowstone region, the Rocky Mountains of Colorado and the Ancient Cliff Dwellers Ruins in s.w. Colorado and adjoining territory, field reports of which appeared in the publications of the Survey.

In 1879 located in Denver, Colorado where for the next 20 years he carried on an extensive business as landscape photography chiefly in the interests of the trans-continental Railways including several journeys into Mexico and the eastern states from the Adirondacks to Florida. In 1895 went abroad and for nearly two years furnished photographic illustrations for a series of articles on modern transportation methods for Harpers Weekly, including scenes in Northern Africa, India, Australia, China, Japan and Siberia from Vladvostock to the Urals. In 1879 merged his business with that of the Photochrome Co. of Detroit, and since then has confined his attention principally to the direction of the technical details of the various processes used by the Company in its publications.



TO COMMEMORATE THE
AUTHORIZATION AND ORGANIZATION
OF THE

U. S. GEOLOGICAL SURVEY

FERDINAND V. HAYDEN
PIONEER GEOLOGIST

AUTHORIZED BY CONGRESS
MARCH 3, 1867

DECEMBER 13, 1930
ELEVENTH AND PENNSYLVANIA AVE.
WASHINGTON, D. C.



FERDINAND VANDEVEER HAYDEN (1829-1887)

American Geologist, was born at Westfield, Mass., on September 7, 1829. He graduated from Oberlin college in 1850 and from the Albany medical college in 1853 where he attracted the attention of Prof. James Hall, State geologist of New York, through whose influence he was induced to join F. B. Meek in an exploration of the "Bad Lands" of Dakota to make collections of fossils. The next two years were spent in a similar exploration of the Upper Missouri under the auspices of the American Fur Co., resulting in the discovery of an important collection of fossils, which was afterwards divided between the academies of science of St. Louis and Philadelphia. In 1856 Lieut. G. K. Warren appointed him one of his assistants in the exploration of the Yellowstone and Missouri Rivers and of the Black Hills. In 1859 he was attached to Capt. W. F. Raynolds' expedition to the upper tributaries of the Yellowstone as surgeon and naturalist, one result of which was his *Geological Report of the Explorations of the Yellowstone and Missouri Rivers in 1859-60* (1869).

During the Civil War Dr. Hayden was actively engaged as surgeon in the Federal army from 1862 to 1865, resigning to become professor of mineralogy and geology in the University of Pennsylvania, which position he retained until 1872. In 1867 he was appointed geologist in charge of the U. S. geological and geographical survey of the territories and from his twelve years of labor there resulted a most valuable series of volumes in all branches of natural history and economic science; and he issued in 1877 his *Geological and Geographical Atlas of Colorado*. Upon the reorganization and establishment of the U. S. Geological Survey in 1879, he acted for seven years as one of the geologists. He died at Philadelphia on December 22, 1887.

His other publications were: *Sun Pictures of Rocky Mountain Scenery* (1870), *The Yellowstone National Park*, illustrated by reproductions of water color sketches by Thomas Moran (1876), *The Great West; its Attractions and Resources* (1880). With F. B. Meek he wrote (*Smithsonian Contributions*, vol. 14, Art. 4) "Paleontology of the Upper Missouri, pt. I, Invertebrate." His valuable notes on Indian dialects are in *The Transactions of the American Philosophical Society* (1862), in the *American Journal of Science* (1862) and in *The Proceedings of the American Philosophical Society* (1869). With A. R. C. Selwyn he wrote *North America* (1883) for Stanford's Compendium.

Obituary notice of Dr. Hayden read before the American Philosophical Society by Prof. J. P. Leslie.

He represented in science the curiosity, the intelligence, the energy, the practical business talent of the western people. In a few years they came to adopt him as their favorite son of science. He exactly met the wants of the Great West. There was a vehemence and a sort of wildness in his nature as a man which won him success, cooperation, and enthusiastic reputation among all classes, high and low, wherever he went. * * * He popularized geology on the grandest scale in the new States and Territories. He easily and naturally affiliated with every kind of explorer, acting with such friendliness and manly justice toward those whom he employed as his co-workers that they pursued with hearty zeal the development of his plans.

I think that no one who knows the history of geology in the United States can fail to recognize the fact that the present magnificent United States Geological Survey * * * is the legitimate child of Doctor Hayden's Territorial Surveys.

—Extracts from Encyclopaedia Britannica, New International Encyclopaedia, and Merrill's Contributions to the History of American Geology.

Order of Exercises

December 13, 1930



DR. WM. H. HOLMES or WM. H. JACKSON, Presiding

AND WILL PRESENT THE TABLET

ADDRESSES BY

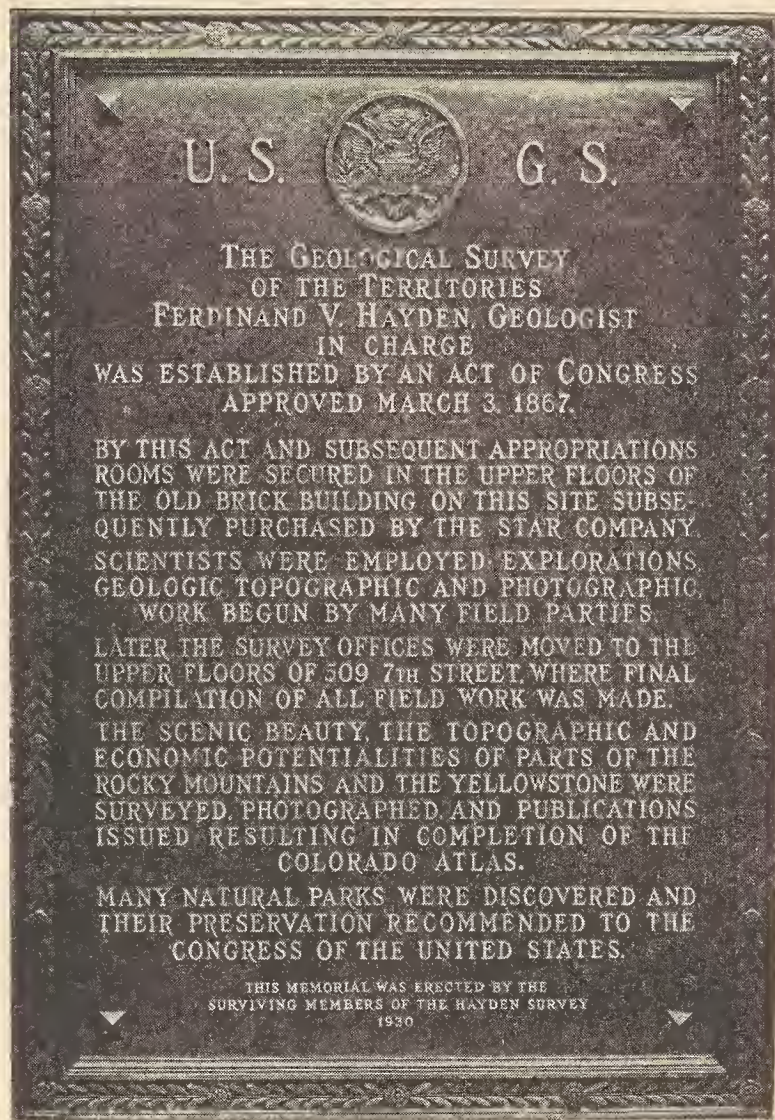
HON. GUY V. HARDY, M. C., Colorado

HON. EDWARD T. TAYLOR, M. C., Colorado

DR. EDGAR L. HEWETT, President Archaeological Institute of America

THE MEMORIAL WILL BE UNVEILED BY

FREDERICK D. OWEN



ERECTED

IN THE MAIN OFFICE, GROUND FLOOR

THE EVENING STAR (NEW BUILDING)

ELEVENTH STREET AND PENNSYLVANIA AVENUE N. W.

WASHINGTON, D. C.

ON BEHALF OF THE SURVIVING MEMBERS OF THE SURVEY

THE SURVEY STAFF

U. S. Geological and Geographical Survey of the Territories

F. V. HAYDEN, U. S. Geologist in Charge

ADAMS, ROBERT JR., Assistant Quartermaster
BATTY, J. H., Naturalist
BECHLER, G. R., Topographer
BERTHOUD, E. L., Civil Engineer
BROOKS, ELI, Civil Engineer
CARPENTER, LIEUT. W. L., Naturalist
CHITTENDEN, GEORGE B., Topographer
COPE, PROF. E. D., Naturalist
COUES, DR. ELLIOT, Ornithologist.
COULTER, JOHN M., Botanist
ENDLICH, DR. F. M., Geologist
GANNETT, HENRY, Topographer
GARDNER, JAMES T., Geographer
HOLMAN, WILLIAM S. JR., General Assistant
HOLMES, WILLIAM H.,
Artist and Assistant Geologist
INGERSOLL, ERNEST, Zoologist
JACKSON, WILLIAM H., Photographer
LADD, S. B., Topographer
LEIDY, PROF. JOSEPH, Naturalist

LESQUEROUX, LEO, Paleontologist
LUCE, E. T., General assistant.
MARVINE, A. R. Geologist
MEEK, F. B. Paleontologist
NEALY, S. H. General assistant
NEWBERRY, PROF. J. S., Geologist
OWEN, F. D. Assist. Topographer and Artist
PACKARD, A. S., Naturalist
PEALE, A. C., Geologist
PEARSON, — Financial clerk
PORTER, T. C., Botanist
RHODA, FRANKLIN, Assistant Topographer
SMITH, S. I., Naturalist
STEVENSON, JAMES, Administrative Chief
STECKLE, HENRY W., Assistant Topographer
TAGGART, W. Bush, Assistant Geologist
THOMAS, PROF. CYRUS, Publications
VERRILL, H. E., Zoologist
WHITE, C. A., Paleontologist
WHITNEY, PROF. W. D., Philologist

WILSON, A. D., Topographer

For Field Work—Guides, Hunters, Packers and Cooks were added to each division.



ELEVENTH STREET AND PENNSYLVANIA AVENUE,
WASHINGTON, D. C.

HEADQUARTERS OF THE U. S. GEOLOGICAL SURVEY
F. V. HAYDEN, GEOLOGIST IN CHARGE

The offices were in the upper part of the building, reached by the outside stairway

This building was demolished in April, 1899

Subsequently, about 1875, rooms were occupied at 509 Seventh Street N. W.

SURVIVING MEMBERS

DR. WM. H. HOLMES
GEORGE B. CHITTENDEN
ERNEST INGERSOLL

WM. H. JACKSON
S. B. LADD
FREDERICK D. OWEN



RANDOM RECORDS OF A LIFETIME
DEVOTED TO SCIENCE AND ART, 1846-1932

BY W. H. HOLMES

LIST OF VOLUMES

- Volume I. Brief Biography, Positions Held, Loubat Prizes, Medals, etc., Societies and Clubs, Bibliography.
- II. Explorations, Episodes and Adventures, Expositions and Congresses.
- III. Part I. Yellowstone Explorations, 1872.
Part II. Yellowstone Explorations, 1878.
- IV. Part I. Colorado Explorations, 1873, 74, 75, 76 & 87.
Part II. The Cliff Dwellers. a MORAN, front-
- V. Europe 1879-80; Grand Canyon of the Colorado; Explorations in Mexico with Jackson and the Chains; Colorado with Powell and Langley, 1887.
- VI. Aboriginal Boulder Quarries, Piney Branch, D. C., Soapstone Quarries, Paint Mines, and Lay Figure Groups.
- VII. The Chicago Venture, University Exposition, Field Museum, Yucatan, Return to Washington, 1892-97.
- VIII. Cuba with Powell; Jamaica with Langley; Mexico with Gilbert and Dutton; California with McGee; Physical Anthropology, Hrdlicka, Current Work 1900.
- IX. Chief Period, Bureau of American Ethnology, 1902-1910; Visits to Stuttgart and Chile 1908.
- X. Transfer to the Museum June 10, 1910, the Guatemalian Trip, Powell Monuments, Seventieth Birthday Celebration, 1920.
- XI. Director of the National Gallery of Art, 1920-1932.

XII. The Freer Gallery of Art.

XIII. Portraits, Smithsonian Institution.

XIV. Portraits, Bureau of American Ethnology. National
Gallery of Art, and Miscellaneous.

XV. Masterpieces of Aboriginal American Art.

XVI. Various Articles on Art and the Art Gallery.

XVII. Personal.

XVIII. Personal.

XIX. Personal.

XX. Personal. Water Color Sketches.



HAYDEN SURVEY OF THE TERRITORIES FOR 1876

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Work of W. H. Holmes.
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"In company with the triangulation party, Mr. Holmes made a hurried trip through Colorado, touching also portions of New Mexico and Utah. He was unable to pay much attention to detailed work, but had an excellent opportunity of taking a general view of the two great plain belts that lie, the one along the east, the other along the west base of the Rocky Mountains. For nearly two thousand miles travel he had constantly in view the Cretaceous and Tertiary formations, among which are involved some of the most interesting geological questions. He observed, among other things, the great persistency of the various groups of rocks throughout the east, west, and north, and especially in the west; that from Northern New Mexico to Southwest Wyoming the various members of the Cretaceous lie in almost unbroken belts.

Between the east and the west there is only one great incongruity. Along the east base of the mountains the Upper Cretaceous rocks, including Nos. 4 and 5, are almost wanting, consisting at most of a few hundred feet of shales and laminated sandstones. Along the west base this group becomes a prominent and important topographical as well as geological feature. In the southwest, where it forms the "Mesa Verde" and the cap of the Dolores Plateau, it comprises upward of two thousand feet of coal-bearing strata, chiefly sandstone, while in the north it reaches a thickness of 3,500 feet, and forms the gigantic "hog-back" of the Grand River Valley.

While in the southwest he visited the Sierra Abajo, a small group of mountains, which lie in Eastern Utah, and found, as he had previously surmised, that the structure was identical with that of the four other isolated groups that lie in the same region. A mass of trachyte has been forced up through fissures in the sedimentary rocks, and now rests chiefly upon the sandstones and shales of the Lower Cretaceous. There is a considerable amount of arching of the sedimentary rocks, caused probably by the intrusion of wedge-like sheets of trachyte, while the broken edges of the beds are frequently, but abruptly, pressed up, as if by the upward or lateral pressure of the rising mass. He was able to make many additional observations on the geology of the San Juan region, and secured much valuable material for the coloring of the final map.

He states that the northern limit of ancient cliff-builders in Colorado and Eastern Utah is hardly above latitude $37^{\circ} 45'$.
(Page XV)

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Holmes' report on the Geology of the Sierra Abajo and West San Miguel Mountains occupies pages 189-196 with illustrations.

1876

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v. 4 p 2

Work of W. H. Holmes in
Colorado, Utah, and New Mexico
with the Primary Triangulation Party of A. D. Wilson.

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TENTH ANNUAL REPORT OF THE
UNITED STATES GEOLOGICAL AND GEOGRAPHICAL SURVEY

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Mr. Holmes report on the trip is found in this report on pages 187 to 195.

The following is quoted from Dr. Hayden's introduction to this Annual Report of the Survey:

"In company with the triangulation party, Mr. Holmes made a hurried trip through Colorado, touching also portions of New Mexico and Utah. He was unable to pay much attention to detailed work, but had an excellent opportunity of taking a general view of the two great plain belts that lie, the one along the east, the other along the west base of the Rocky Mountains. For nearly two thousand miles travel he had constantly in view the Cretaceous and Tertiary formations, among which are involved some of the most interesting geological questions. He observed, among other things, the great persistency of the various groups of rocks throughout the east, west, and north,



